CONTENTS

MANITOU NORTH AMERICA, INC.

6401 IMPERIAL DRIVE
Waco, TX 76712-6803

For Parts Orders contact your Manitou North America Dealer or call:
Manitou North America, Parts Dept. 800-425-3727 or (254) 799-0232
Parts Dept. Fax: (254) 867-6504 Website: www.manitou-na.com

CALIFORNIA PROPOSITION 65 WARNING

Diesel Engine Exhaust and some of its constituents are known to the State of California to cause cancer, birth defects or other reproductive harm.

M2 30/40 C P/C -PS/-P
M2 30/40 C P/C -PL/-PXL
M4 30/40 C P/C -PS/-P
M2/4 50 C P/C -PS

4 SPEED TRANSMISSION

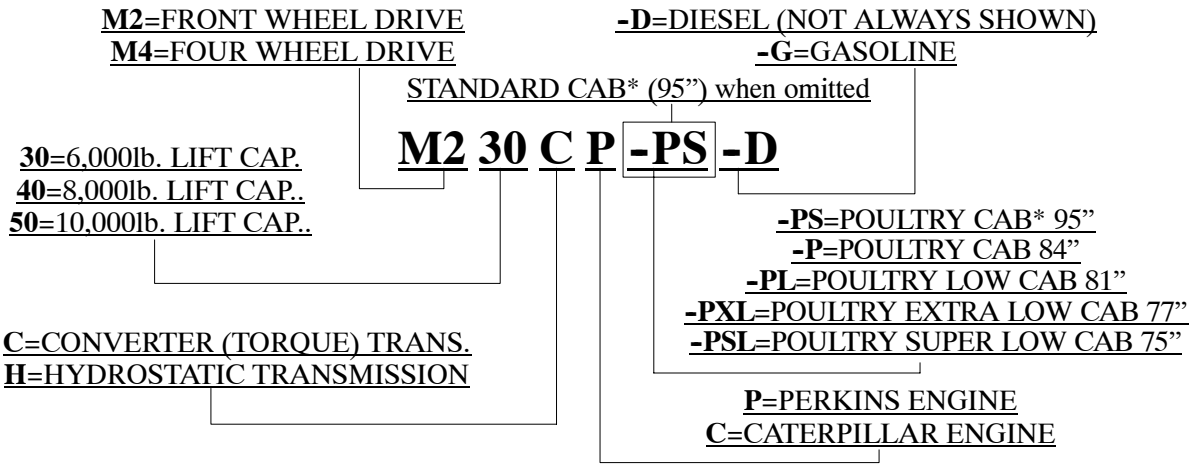
S/N: M2300546, M240332, M2500264,
M4300288, M4400372, M4500252 and ABOVE
S/N: 164968 thru 181963
(except 170493 & 170514)

OPERATOR/SERVICE MANUAL

THIS OPERATOR'S MANUAL MUST BE KEPT IN THE LIFT TRUCK. IT MUST BE READ AND UNDERSTOOD BY THE LIFT TRUCK OPERATOR.

CATALOG B426
R04-2000

'M' SERIES LIFT TRUCK MODEL NO. DESCRIPTION



* The STANDARD or POULTRY CAB 95" has an enclosed steering column, only the upper column can be seen. The POULTRY CAB 84", 81", 77" & 75" has an exposed steering column, the entire column is visible.

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SECTION ONE

NOTICE! *STUDY THE ENTIRE MANUAL BEFORE OPERATING THE* ***LIFT TRUCK****!*

FORKLIFT OPERATION AND SAFETY 1 - 1

NOTICE! *STUDY THE ENTIRE MANUAL BEFORE OPERATING THE* ***LIFT TRUCK****!*

SAFETY MESSAGES

NOTE THE SAFETY ALERT SYMBOL (SHOWN BELOW). IT IDENTIFIES POTENTIAL HAZARDS WHICH, IF NOT AVOIDED, MAY RESULT IN INJURY OR DEATH! Also, observe the safety messages placed throughout this manual; providing special instructions, telling you when to take precautions and to identify potential hazards. The safety messages are highlighted and outlined in a box similar to those shown in the examples below.

SAFETY ALERT SYMBOL

NOTE or **NOTICE**
Provides information, special instructions or references about the lift truck.

IMPORTANT
Precautions which must be taken to avoid damage to the lift truck

CAUTION
Indicates a potentially hazardous situation which, if not avoided, *may result in minor or moderate injury.* May also alert against unsafe practices.

WARNING
Indicates a potentially hazardous situation which, if not avoided, *may result in death or serious injury.*

DANGER
Indicates an imminently hazardous situation which, if not avoided, *will result in death or serious injury.*

CALIFORNIA PROPOSITION 65 WARNING

WARNING: Engine Exhaust, some of its constituents, and certain vehicle components contain or emit chemicals known to State of California to cause cancer and birth defects or other reproductive harm.

FORKLIFT OPERATION REQUIREMENTS

STUDY THE OPERATOR/SERVICE MANUALS

The information in this manual provides general instructions for the safe operation and maintenance of the ***'M' Series 4-Speed Forklift Truck***. This information is vital and must be clearly understood by the operator/serviceman. Study this manual (part no. B426) and the RoughTerrain Forklift Safety Manual (part no. 422494) thoroughly and carefully before operating or servicing your forklift. Contact your Manitou dealer if you have any questions concerning your forklift, its operation, service or parts. Keep both manuals in the literature box on the forklift available for reference. If either manual becomes illegible or is missing, contact your dealer for replacements immediately. Additional recommended literature: ANSI / ITSDF B56.6 Industrial Truck Standards Development Foundation (ITSDF). It can be obtained free of charge on their website at www.itsdf.org. *This manual cannot cover every situation that might result in an accident. It is the responsibility of the operator to always remain alert for potential hazards and be prepared to avoid them!*

ATTEND OPERATOR TRAINING CLASSES

WARNING	Authorized Operator Training required!

The forklift operator must clearly understand all instructions concerning the safe operation of the forklift and all safety rules and regulations of the work site. They must have successfully completed a training coarse in accordance with the Powered Industrial Truck Standard (29 CFR 1910.178) as described by the Occupational Safety and Health Administration (OSHA). They must be qualified as to their visual, hearing, physical, and mental ability to operate the equipment safely. NEVER use drugs or alcohol while operating a forklift! NEVER operate or allow anyone to operate a forklift when mental alertness or coordination is impaired! An operator on prescription or over-the-counter drugs must consult a medical professional regarding any side effects of the medication that may impair their ability to safely operate the forklift.

CREATE A MAINTENANCE PROGRAM

OSHA recommends a maintenance log, listing repairs requested and completed, for each forklift. Also, "lock out tag procedures" should be utilized. If the forklift malfunctions; park it safely, remove the key, tag "Do Not Use", and report the problem to the proper authority or authorized service personnel immediately.

For the best forklift performance and operation, a maintenance program is required. Use the hour meter on the instrument panel to keep maintenance properly scheduled (see SECTION TWO - "SERVICING SCHEDULE"). For repairs on major components (engine, transmission, etc.), contact your nearest dealer for a Repair Manual (part no. B378). Do not operate a forklift that is damaged or does not function properly. After repairs, the lift truck must be tested for safe operation before returning to service.

FORKLIFT OPERATION REQUIREMENTS (cont.)

KNOW THE FORKLIFT

⚠ WARNING	Knowledge of the Forklift is essential!

Study all of the manuals provided for your forklift model. Learn the locations and meanings of all safety decals. If any decals are illegible or missing, have them replaced immediately. Make sure all safety features provided by the original manufacturer are in place and function properly. Do not operate a forklift with damaged, missing or unsafe components. Have it repaired by authorized service personnel. Learn the functions of all controls, gauges, indicator lights, etc. on the forklift. Know the speed/gear ranges, braking and steering capabilities, load ratings and clearances. If you have any questions about the forklift, consult your supervisor. Failure to fully understand or obey safety warnings can result in serious injury or death!

KNOW THE WORK SITE

⚠ WARNING	Carefully inspect the work site for a safe route!

Before operating on a work site, learn the rules for movement of people, forklifts and all other traffic. Check the size, weight, and condition of the loads you will be expected to handle. Verify that they are properly secured and safe to transport. Learn where the loads are to be placed, planning your route for a safe approach, watching for hazardous conditions. Will a signal man be required to help place the load? Remove any debris which may cause tire damage or rupture. Plan your route around problem areas or have them corrected. Inform the supervisor of any unsafe conditions observed at the site. Examples of hazards: power lines, cables, low clearance structures, garage doors, telephone pole guide lines, fencing, loose lumber, building materials, drop-offs, trenches, rough/soft spots, oil spills, deep mud, steep inclines, railroad tracks, curbs, etc.. NEVER approach power lines, gas lines or other utilities with the forklift! Always verify that local, state/provincial and federal regulations have been met. Always remain alert - conditions are constantly changing at the work site!

TECHNICAL SUPPORT

All data provided in this manual is subject to production changes, creation of new models, and improved product designs. If a question arises regarding your forklift, please consult your dealer or K-D Manitou, Inc. for the latest information. When ordering service parts or requesting technical information, be prepared to quote the applicable Model/Serial Numbers (see SECTION THREE - "SPECIFICATIONS"). Also, remember that the terms "left", "right", "front", and "rear" refer to the location of forklift components in relation to the operator seated normally, facing forward in the operator's seat.

SAFETY RULES FOR OPERATORS

⚠ WARNING	Learn these rules and maintain safe operating procedures at all times!

The operator must be on constant alert to hazardous conditions; to protect himself, other personnel, the forklift, surrounding structures, materials and equipment!

1. Understand the operating rules for the forklift.

2. DO NOT operate any forklift unless you are properly trained and authorized for that particular type of forklift.

3. DO NOT operate any forklift with wet or greasy hands or feet.

4. Ensure the following checks have been made before operating the forklift:

   a.) Tires: Check condition and pressure of tires.
   b.) Warning Devices: Verify that they are working.
   c.) Lights: Check that they are clean, working and aimed properly.
   d.) Brakes: Check that they are working properly.
   e.) Lift and Tilt: Check for leaks, worn or cracked chains or fork damage.
   f.) Guards: Check that overhead guard and load backrest is in place and functional.
   g.) Battery: Check battery terminals.
   h.) Leaks: Check for engine oil, fuel, hydraulic oil and water leaks.
   i.) Steering Mechanism: Check for full motion without slack or tight spots.
   j.) Controls: Check for full motion and proper function.
   k.) All Fluid Levels: Check fuel tank, radiator (when cool), hydraulic tank, brake fluid and battery.

   DO NOT operate forklift if it is in need of repair. If it is in an unsafe condition, or if it might contribute to an unsafe condition, tag the forklift, remove the key, and report the condition to the proper authority. If the forklift becomes unsafe in any way while you are operating it, safely park the forklift and report the matter immediately to the proper authority.

⚠ WARNING
Report faulty push-pull cables (throttle control cable, park brake cable, etc.) immediately! Never adjust or modify the control cable(s) with the power on or the engine running, serious injury or death could result!

5. Be certain that your forklift is the correct fire safety type for the area in which you are working. The proper type designation for the forklift is on the nameplate. In areas classified as hazardous, use only forklifts approved for use in those areas. If you are unsure of the classification of the area you wish to enter, ask your supervisor before entering.

6. DO NOT remove overhead guard or load backrest extension unless specifically authorized.

7. DO NOT start or operate the forklift or any of its functions or attachments if you are not in the designated operator's position.

8. Keep hands, feet and other parts of your body inside the operator's designated area.

9. DO NOT put any part of your body into the mast area or between the mast and forklift. Also, be aware of pinch points on attachments, especially reach mechanisms.

10. DO NOT allow anyone to stand or walk under the elevated portion of any forklift whether it is empty or loaded.

SAFETY RULES FOR OPERATORS (cont.)

11. | ⚠ WARNING | NEVER PERMIT PASSENGERS ON THE LIFT TRUCK! |

12. Observe and comply with instructions concerning floor loading. Forklift weight information is on the nameplate.

13. Travel with load engaging means low and, where possible, tilted back. DO NOT elevate the load except during stacking.

14. Look in the direction of travel, keeping a clear view of the path of travel, observing other traffic, personnel, and safe clearances.

15. When visibility is impaired, operate forklift with opposite end in the travel direction, or use extreme caution.

16. A rough terrain forklift truck should not be used to lift people unless there is no other practical option. If a rough terrain forklift truck must be used to lift people, several precautions must be taken as outlined in ASME and OSHA standards. Contact manufacturer for details.

17. DO NOT overload the forklift, check capacity plate for load capacity and load center information.

18. Start, stop, travel, steer and brake smoothly. Slow down for turns & uneven or slippery surfaces that could cause truck to overturn or slide.

19. Use special care when traveling without a load, the risk of overturning may be greater when cornering and at a high speed.

20. Before entering trucks or trailers, be certain the brakes on the truck or trailer are applied and the wheel chock(s) are in place. If trailers are not coupled to a tractor, supports may be needed to prevent upending or corner dipping.

21. Before driving over a dock board or bridge plate, be certain that it is properly secured. Drive carefully and slowly across the dock board or bridge plate, and never exceed its rated capacity.

22. DO NOT run over objects on the roadway surface as forklift stability could be adversely affected.

23. When approaching cross aisles, slow down, sound horn and if vision is obstructed, keep on the right side. Operate the forklift under all conditions at a speed that will permit it to be brought to a stop safely.

24. Use special care when operating on an incline, travel slowly and do not angle or turn.

25. DO NOT operate on grades in excess of that recommended by the forklift manufacturer. When ascending or descending, operate loaded forklift with the load upgrade.

26. Operate unloaded forklifts on all grades with the load engaging means downgrade.

27. Yield the right of way to pedestrians.

28. DO NOT handle unstable or loosely stacked loads. Use special care when handling long, high, or wide loads to avoid losing load, striking bystanders, or tipping the truck.

SAFETY RULES FOR OPERATORS (cont.)

29. When attachments are used, extra care should be taken in securing, positioning and transporting the load. Operate forklifts equipped with attachments as partially loaded trucks. Handle only loads within the capacity of the forklift and attachment. The forklift capacity plate should indicate the capacity of the truck and attachment combination. Check the attachment manufacturer's operator's manual for more specific information.

30. Operate tilting mechanism slowly and smoothly. DO NOT tilt forward when elevated except to pick up or deposit a load in a rack or on a stack. When stacking, use only enough back-tilt to stabilize the load.

31. If upright malfunctions or becomes stuck in a raised position, operate lift control to eliminate any slack chains. DO NOT go under the elevated portion of the forklift to attempt repairs.

32. Only specifically authorized and qualified persons shall make repairs or adjustments to the forklift.

33. Fumes from operation of engine powered forklifts in poorly ventilated areas can be harmful to health. Turn off engine when not in use.

34. If a forklift has to be parked on an incline, chock the wheels.

35. Report all accidents involving personnel, building structures, and equipment to proper authority.

36. Before leaving the forklift, be sure that the lifting mechanism is lowered, controls are placed in neutral, parking brake is applied, power is shut off and the control or ignition circuit is turned off. Keep forklift clear of exits and access to stairways and fire equipment.

37. When leaving your forklift unattended, the forklift should be secured against operation by unauthorized personnel.

38. On forklifts equipped with individual wheel brake pedals, lock pedals together for simultaneous operation before travel on public roads when changing job sites.

39. On forklifts equipped with differential lock, the lock should not be engaged when driving on the road or at high speeds or when turning. If the lock is engaged when turning, there could be loss of steering control.

40. When lifting to high levels, be certain the forklift is level and clear of trench walls or excavations.

41. Use caution when maneuvering near scaffolding, trenches and excavations.

42. Where possible, use site roadways and choose the route that avoids steep, slippery or loose gradings and unsettled trenches.

43. Drive in such a manner as to minimize bouncing as this could cause loss of control of the forklift.

44. To lessen the chance of injury in accidents or sudden stops the operator is urged to be properly restrained at all time, using the seat belt provided.

45. DO NOT raise, carry nor allow personnel on the forks of the forklift.

46. DO NOT attempt to open or close train car doors with the forklift.

SAFETY RULES FOR OPERATORS (cont.)

47. DO NOT handle loads which are higher than the backrest or backrest extension unless the load is fully secured.

48. Elevate forks or other lifting mechanism only to pick up or stack load. Lift and lower with mast vertical or tilted slightly back, NEVER FORWARD. Watch out for obstructions, especially overhead.

49. When using forks, space forks as far apart as load will permit. Before lifting, be sure that the load is centered and forks are completely under load.

50. Understand the forklift's limitations and keep the forklift under control. Do not try to do too much too fast.

51. Check clearance carefully before driving under electrical lines, bridges and entering or leaving buildings.

52. An overhead guard is intended to offer protection from falling objects, but cannot be considered protection against every possible impact. Therefore, it should not be considered a substitute for good judgment and care in load handling.

53. DO NOT add to or modify the forklift.

54. DO NOT pass another forklift traveling in the same direction at intersections, blind spots or at other dangerous locations.

55. Slow down and sound the audible warning device(s) at locations where vision is obstructed.

56. Railroad tracks should be crossed at an angle wherever possible. DO NOT park closer than 6 feet (1830mm) to the nearest rail of a railroad track.

57. Trucks steered with their rear wheels have exaggerated tail swing. Operator familiarity with this feature is necessary for safe operation.

58. DO NOT indulge in stunt driving or horseplay.

59. Make starts, stops, turns or direction reversals in a smooth manner so as not to shift and/or overturn the forklift.

60. Slow down for wet and slippery surfaces. Operate at speeds which are compatible with the conditions encountered.

61. Avoid running over loose objects on the roadway surface.

62. The handling of suspended loads by means of crane arm (boom) or other device, can introduce dynamic forces affecting the stability of a forklift that are not considered in the stability criteria. Sudden stops, starts and turns can cause the load to swing and create a hazard. The following precautions shall be taken when handling suspended loads:
    a.) DO NOT exceed the forklift manufacturer's load rating of the truck as equipped for handling suspended loads.
    b.) The load shall only be lifted vertically and never dragged horizontally.
    c.) The load shall be transported with the bottom of the load and the mast as low as possible.
    d.) Maneuvering the forklift with load elevated shall be done slowly and cautiously and only to the extent necessary to permit lowering to the transport position.

SAFETY RULES FOR OPERATORS (cont.)

63. When attachments are used, extra care shall be taken in securing, manipulating, positioning and transporting the load. Operate forklifts equipped with attachments as partially loaded forklifts even when not handling a load.

64. The engine shall be stopped and the operator shall not be on the forklift while refueling.

65. Before refueling LP gas-powered forklifts, close the LP gas cylinder valve. If the system does not include a self sealing disconnect coupling, run the engine until it is out of fuel and stops running.

66. DO NOT smoke while refueling.

67. DO NOT operate a forklift with a leak in the fuel system.

68. DO NOT use open flames when checking electrolyte level in storage batteries or liquids in fuel tanks.

69. Spillage of oil or fuel shall be carefully washed away or completely evaporated and fuel tank cap replaced before starting engine.

70. Handle LP gas tanks with care. Physical damage, such as dents, scrapes or gouges may dangerously weaken the tank and make it unsafe for use.

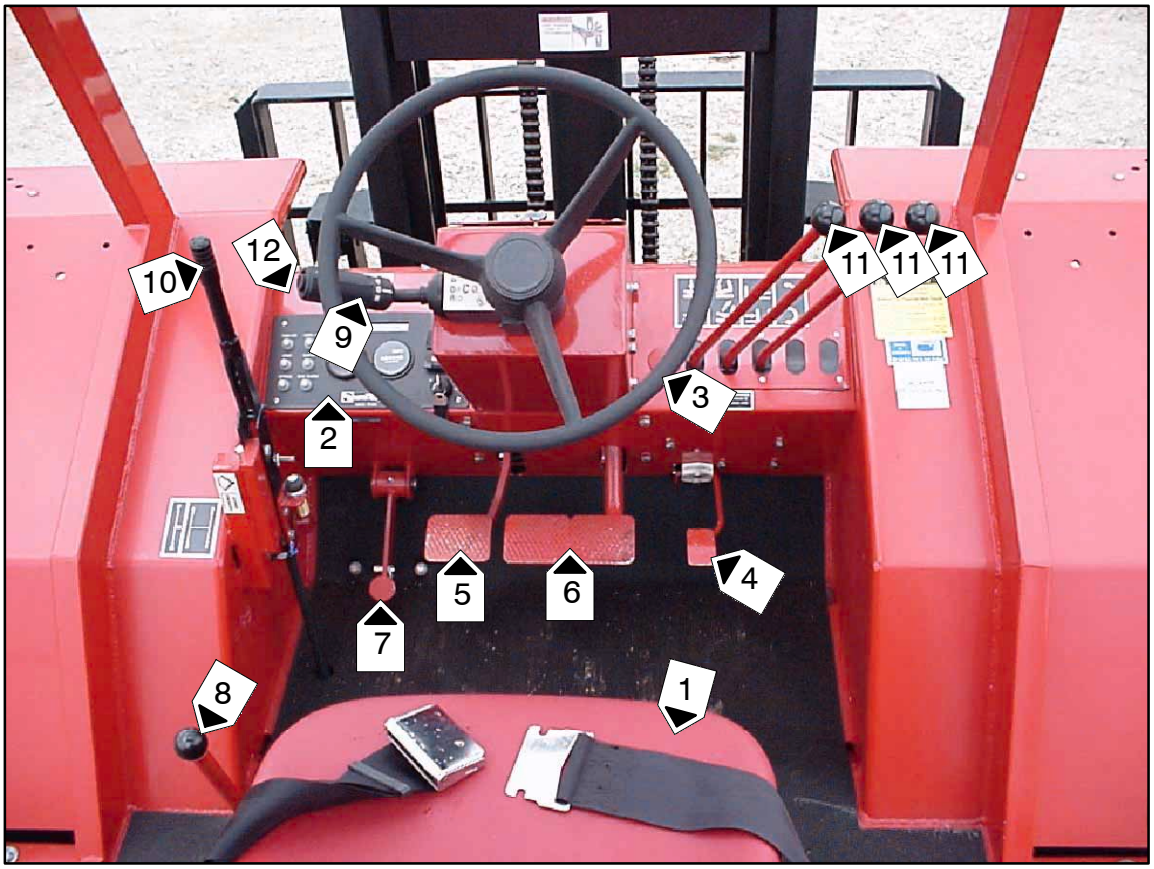
71. When removing tires, follow industry safety practices. Most important - deflate tire completely prior to removal. During assembly, use a safety cage or restraining device while inflating tires.

72. Some forklifts may have the optional 45 degree tilt cylinders installed and must be operated per instructions on the decal below which is installed on these trucks.

73. Do not lift personnel with the forklift. If the forklift must be used to lift people, precautions for the protection of the personnel must be taken. See ITSDF B56.6, chapter 5.15 Elevating Personnel. The information can be obtained free of charge, from the Industrial Truck Standards Development Foundation (ITSDF) on their website at www.itsdf.org.

WARNING
This unit is equipped with special 45 degree laydown tilt cylinders. The full 45 degree tilt feature is to be used for TRANSPORTING on truck or trailer only and not on the jobsite. DO NOT tow the forklift with the mast tilted forward. DO NOT tilt mast forward beyond 20° with mast extended, other than for ground clearance.
B6143

INSTRUMENTS AND CONTROLS



DESCRIPTIONS:

1 *- DRIVER'S SEAT AND SEAT BELT*
2 *- INSTRUMENT PANEL & IGNITION SWITCH*
3 *- STEERING WHEEL*
4 *- ACCELERATOR PEDAL*
5 *- CONVERTER RELEASE PEDAL (INCHING PEDAL)*
6 *- SERVICE BRAKE PEDAL*
7 *- DIFFERENTIAL LOCK PEDAL*
8 *- GEAR SELECTION LEVER*
9 *- FWD/REV LEVER, HORN & LIGHTS*
10 *- PARKING BRAKE LEVER*
11 *- HYDRAULIC CONTROL VALVE LEVERS*
12 *- WARNING LIGHTS*

See the following pages for detailed descriptions of instruments and controls shown above.

INSTRUMENTS AND CONTROLS (cont.)

The operator must familiarize himself with the name, location, and operation of the controls and instruments before operating the forklift. It is recommended that all instruments be checked immediately after starting the engine, after the engine has warmed, and at frequent intervals while operating the forklift.

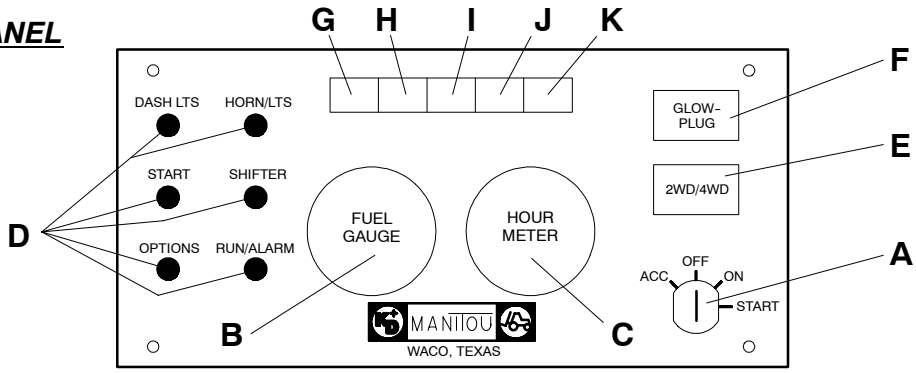
WARNING	If a malfunction develops during operation; safely park the forklift, remove the key, tag the truck "Do Not Use", and notify the proper authorities.

1 - DRIVER'S SEAT AND SEAT BELT

SEAT ADJUSTMENT: While seated; slide the lever (located under the front of the seat) to the left to unlock the seat, moving the seat forward or reverse to the desired position. Lock the seat in place by releasing the lever and pushing the seat backward and forward.
SEAT BELT ADJUSTMENT: Check that the seat belt is not twisted. Adjust the belt at hip level and not across the stomach. Insure the belt locks properly. Adjust the belt to your body shape without squeezing your hip. The belt should fit tight enough to keep your body from leaving the seat until the belt is released.

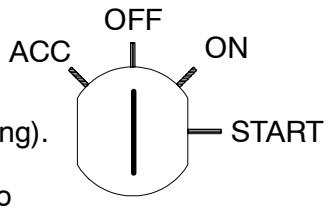
WARNING	ALWAYS WEAR THE SEAT BELT WHILE OPERATING THE FORKLIFT! If the seat belt becomes damaged or worn, report the problem and have it replaced immediately!

2 - INSTRUMENT PANEL



A – ***Ignition Switch***

The ignition switch has four positions:



OFF – Stop engine position; all instruments and lights off. Able to insert or remove key.

ON – Instruments on, lights available. Engine running position (after starting). Cannot remove key.

START – Engine start; push-in and turn. When the engine starts, return key to position ON. Do not operate starter for more than 30 seconds at a time, allow the starter to cool between starting attempts.

ACC – Provides use of Accessories with engine off. Cannot remove key.

INSTRUMENTS AND CONTROLS (cont.)

2 - INSTRUMENT PANEL (cont.)

B – *Fuel Level Gauge*

Indicates the amount of fuel in the fuel tank. To avoid condensation, keep the fuel tank full.

IMPORTANT	Avoid allowing the engine to run out of fuel. If a *diesel* engine has run out of fuel, it will be necessary to bleed the air out of its fuel system. (See SECTION TWO – "BLEEDING THE FUEL SYSTEM")

C – *Hour Meter*

The hour meter records the number of hours the forklift has operated. Use the hour meter as a guide for scheduling truck maintenance. Keep accurate records of inspections, adjustments, and repairs made on the forklift by recording the hour meter readings.

D – *Breaker Switches*

The breaker switch pops up when a short circuit occurs in the electrical system. Determine the cause of the short circuit and make the necessary repairs before resetting the breaker. To reset the breaker, push the breaker switch in.

⚠ **CAUTION**	When the breaker pops out, the electrical system requires immediate repair! Electrical shorts can lead to serious damage to the electrical system and/or fire on the forklift!

E – *Transmission Switch 2WD/4WD* *(4WD Lift Trucks only)*

This switch is used to activate Four Wheel Drive (4WD), applying power to the rear steer wheels. The switch may be activated (indicated by the red light) anytime the engine is running. Use the 4WD option when requiring extra traction on soft or slippery terrain. Return the switch to 2WD when traveling on pavement or hard packed road conditions.

IMPORTANT	Use of 4WD on hard surfaces causes excessive wear on the powertrain and tires!

F – *Glow Plug (engine pre-heat)*

This switch is used to pre-heat the air intake chamber for cold weather starting (0^{O} to 40^{O}F). Before starting the engine, engage the switch (red light indicates pre-heat is on) for 15-20 seconds. Do not engage the switch while starting or running the engine.

⚠ **WARNING**	NEVER USE ETHER OR OTHER COMBUSTIBLES TO START AN ENGINE EQUIPPED WITH A GLOWPLUG! AN EXPLOSION AND/ OR FIRE COULD RESULT, CAUSING SERIOUS INJURY OR DEATH!

INSTRUMENTS AND CONTROLS (cont.)

2 - INSTRUMENT PANEL (cont.)

G – *Parking Brake Indicator*

The light indicates the parking brake is engaged. Push the park brake lever forward to release the park brake (the parking brake light will turn off). (See SECTION TWO, for Park Brake Adjustment.)

⚠ **WARNING**	ALWAYS ENGAGE THE PARK BRAKE BEFORE DISMOUNTING! DO NOT drive the forklift with the Park Brake engaged. It will damage the brakes, which may lead to loss of control, serious injury, or death!

H – *Charge Warning Light Indicator*

The light indicates that the battery is not being charged. It is on when the ignition key is placed in position ON, before the engine is started. If the light remains on after the engine is running, park the lift truck and have the charging system repaired immediately (fan belt, alternator, battery, etc.).

IMPORTANT	The warning light indicates a faulty charging system. Have the forklift serviced immediately.

I – *Engine Oil Pressure Indicator*

The light indicates low oil pressure. It is on when the ignition key is placed in position ON, before the engine is started. The light goes off after the engine starts and the proper oil pressure is maintained. If the light remains on or comes on while the engine is running, stop operations and have the engine oil level checked.

IMPORTANT	DO NOT run the engine with low oil pressure. Serious engine damage may result! Have the engine serviced immediately.

J – *Engine Water Temperature Over-Heat*

The light indicates engine over-heat. Safely park the forklift and report the problem immediately!

⚠ **WARNING**	NEVER OPEN A HOT RADIATOR! Escaping hot coolant, steam and vapors can cause severe burns! Allow the engine to cool, then remove the radiator cap very slowly, allowing pressure to release.

IMPORTANT	Continued operation of an over-heated engine may result in serious engine damage! Report the problem immediately!

K – *Air filter Restriction Indicator*

The light indicates that the air filter is dirty and needs to be cleaned or replaced. When servicing the air filter, inspect the entire air intake system, checking for damages and cleanliness (be sure to inspect the air pre-cleaner attached to the hood).

INSTRUMENTS AND CONTROLS (cont.)

3 - STEERING WHEEL

Used to control the direction of the forklift by steering the REAR wheels.

CAUTION	Use extreme caution while learning to steer the forklift! The rear end of the forklift swings around quickly when making abrupt or fast turns!

The steering system is sensitive to the movement of the steering wheel. Always exercise *CAUTION* when making turns.

4 - ACCELERATOR PEDAL

The accelerator pedal is used to control the engine speed (RPM), the speed of the load being maneuvered (raising, lowering, etc.), and the speed of the truck. Use the accelerator to keep the forklift at a slow, safe speed while learning the controls and forklift maneuvers. Accelerate smoothly, slowing before turns. When raising or lower loads, use a safe and controlled speed.

5 - CONVERTER RELEASE/DUMP PEDAL

Disengages transmission from drive, allowing operator to shift gears while in motion. Also permits "inching" control of forward/reverse movement while lifting or placing loads.

6 - SERVICE BRAKE PEDAL

The Brake Pedal applies the brakes simultaneously on both front wheels to slow and/or stop the forklift. Apply the brakes progressively, avoiding abrupt stops. Be especially alert when cornering, carrying heavy loads or operating on slight inclines. A greater stopping distance is required!

WARNING	DO NOT RIDE THE BRAKES! Engaging the brakes continuously may lead to brake failure, causing loss of control leading to serious injury or death!

7 - DIFFERENTIAL LOCK PEDAL

Locks both front wheels into drive for better traction in loose soil or mud. Press the pedal down to engage the lock, release the pedal to disengage. Do not use the differential lock on compacted ground or pavement.

CAUTION	When both drive wheels are locked in place by the differential lock, some loss of steering may occur. When possible, steer straight when engaging the differential lock.

INSTRUMENTS AND CONTROLS *(cont.)*

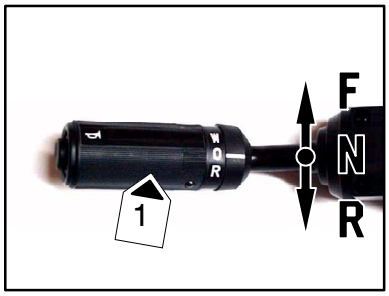
8 - GEAR SELECTION LEVER

The lever is used to select the gear ratio required during operation of the truck.

1. Place gear shift lever in the neutral position between 1st and 2nd gear (note gear shift pattern decal located in the cab) to start engine. NOTICE: The forward reverse lever must be in the neutral position to start engine.
2. After the engine has warmed, press the converter release pedal and move the gear shift lever to the 1st gear position. If you have a problem engaging the gear shift lever; move the forward reverse lever into the forward position for a moment, then back to the neutral position. Now move the gear shift to 1st gear.
3. To change gears, press the converter release pedal and move to the desired gear.

NOTE: DO NOT grind the gears while shifting.

9 - FORWARD / REVERSE LEVER, LIGHT SWITCH & HORN



Forward / Reverse lever - This lever (1) is used to select neutral, forward or reverse travel of the truck:

a) Place the lever midway between forward and reverse for neutral. NOTE: The truck must be in neutral to start the engine.

b) For forward motion, push the lever upward.

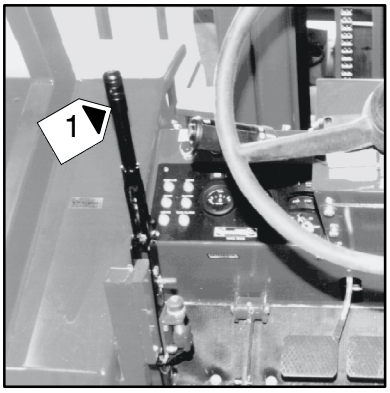
c) For backing, pull the lever down (the backup alarm must sound).

For load positioning, while the forklift is in a stationary position, shift the forward reverse lever to neutral.

Light switch - Rotate the handle to "W" to turn the white lights on, to the "R" for red lights on, or "O" for all lights off.

Horn - Push the button on the end of the handle to sound the horn. Use the horn to alert others of your operations and movements.

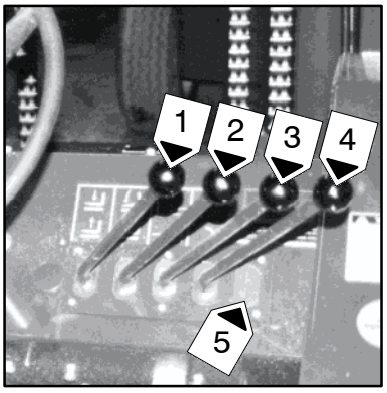
10 - PARKING BRAKE LEVER



The park brake lever (1) is used when parking the lift truck. It applies braking to both front wheels. To engage the parking brake, pull the lever back, until locked in place (see photo at right). Push the lever forward to release the brake. Always release the brake before driving the truck. When properly adjusted, the park brake requires considerable force (up to 80 ft.lbs.) to lock in place. (See SECTION TWO, for Park Brake Adjustment.)

⚠ **WARNING**	ALWAYS ENGAGE THE PARK BRAKE BEFORE DISMOUNTING FORKLIFT!

INSTRUMENTS AND CONTROLS *(cont.)*



11 - HYDRAULIC CONTROL VALVE LEVERS

1 – ***Lift lever***
Pull the lift lever back to raise the forks, push the lever forward to lower the forks.

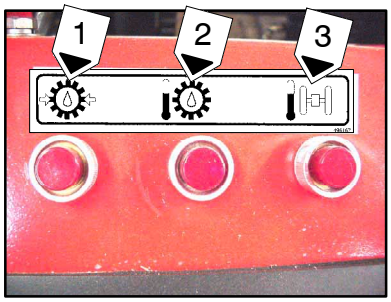
WARNING	DO NOT DRIVE THE FORKLIFT WITH THE MAST EXTENDED!

2 – ***Tilt lever***
The tilt lever tilts the mast forward when pushed forward and tilts the mast back when pulled back. NOTICE: Use extreme caution when tilting a fully extended mast! Tilt the load only as much as necessary to set it in place, then back away. As soon as the forks have cleared the load, tilt back and lower the mast.

3 – ***Side shift lever***
This lever shifts the mast and load to the right when pulled back and to the left when pushed forward. Use the lever to align the forks with a load or pallet upon approach and for alignment when placing the load. When moving large or heavy loads, use the side shift lever to keep the load centered with the lift truck.

4 & 5 – ***Additional control valve levers***
May be added for optional hydraulic attachments (contact your nearest dealer).

12 - WARNING LIGHTS *(located above the Instrument Panel)*



IMPORTANT	These warning lights indicate mechanical problems which may result in damage to the forklift powertrain!

1– The ***Trans Oil Press*** light, indicates that the transmission oil pressure is low. Stop operations immediately and have the transmission cooling system and the transmission oil level checked.

2– The ***Trans Oil Temp*** light, indicates that the transmission oil is too hot.

WARNING	THE EXHAUST PIPE IS HOT! Wear gloves when checking the transmission oil!

Stop operations immediately and check the transmission cooling system and transmission oil level.

3 – The ***Hot Axle*** light *(all Poultry models, optional on non-poultry)*, indicates that the drive axle oil is over-heating.

WARNING	Low level or over-heated drive axle oil may lead to brake failure, causing loss of control leading to serious injury or death!

Stop operations immediately and have the drive axle oil level checked. *Models with the optional Drive Axle Cooling System:* Stop operations, run the engine at half throttle in neutral for two minutes (allowing the oil to circulate and cool), then stop the engine and check the drive axle cooling system and oil level.

DRIVING THE FORKLIFT

STARTING THE ENGINE

1. Always check the fuel level, engine oil, radiator coolant and hydraulic oil before starting the engine.
2. Verify that the forward/reverse and gear selection levers are in the neutral position and that the park brake is engaged.
3. Start the engine as follows:
   a) Insert the key into the ignition switch and turn to the ”ON” position. In this position the alternator warning light will illuminate.
   b) Engine preheat (for cold weather only, 0^0 to 40^0F):
   before starting the engine, activate the engine preheat switch (located on the instrument panel) for 15-20 seconds. Release the switch.
   c) Turn the key to the start position, engaging the starter until the engine starts. If the engine does not start after 30 seconds, turn the key to the “OFF” position. Allow the starter to cool for two minutes before retrying. After the engine starts the alternator warning light should go out.

DRIVING AND PARKING THE FORKLIFT

1. Run the engine at a fast idle for a few minutes, allowing it to warm up.
2. Lift the forks clear of the ground.
3. Engage first gear.
4. Release the parking brake.
5. Move the forward/reverse lever to the direction of travel and accelerate gently.
6. The power steering system is sensitive to movement of the steering wheel; turn the steering wheel slowly, while becoming accustomed to rear wheel steering!
7. Apply the service brake gradually, as required, to bring the forklift to a halt. Avoid abrupt stopping.
8. When changing the direction of travel, stop the truck, reposition the forward/ reverse lever and then proceed in the opposite direction.
9. When parking, place the forward/reverse lever in the neutral position.
10. Apply the parking brake.
11. Place the gear selector lever in the neutral position.
12. Lower the forks or attachments until they are resting on the ground.
13. Switch the ignition off and remove the key.
14. Before stopping a hot engine, allow it to run at a high idle for a few minutes. This allows the oil and coolant to circulate, reducing the temperature of the moving parts in the engine and transmission.
15. If required to park on an incline, park the forklift (as instructed above) at right angles to the slope, and block the wheels.

LIFTING AND HANDLING LOADS

Check Capacities

Before lifting a load; check the size, weight, and condition of the load. Determine that the load is within the forklift's rated capacity. If the load is not properly marked, check with your supervisor for verification of weight. If the load is too heavy, have it divided if possible.

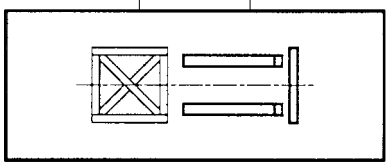
Check Load Stability

Verify that the load is properly wrapped/banded and safe to transport. Check the condition of the pallet/skid, does it need to be replaced? If the load is of loose materials or is poorly wrapped, it must be made secure. Secure the load so that it will not shift or fall during transport. For better stability, attach the load to the backrest when necessary. Also, note the center-of-gravity of the load, where to place the forks for stable transport.

Check Receiving Area

Before placing the load, check the receiving area; will the area support the load, is it clear of debris? Plan your route for a safe approach, watching for hazardous conditions. Will a signal man be required to help place the load?

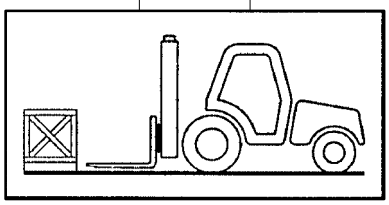
FIG. 1



Fork Adjustment

Safely park the forklift, with the forks raised slightly. Unlock the fork locking pins (where applicable) and position the forks as wide as the load allows. Keep the forks the same distance from the center of the carriage. Secure the fork locking pins (where applicable).

FIG. 2



Lifting a Load From Ground Level

1.) Approach the load slowly, aligning the forklift and forks with the load (fig. 1). Stop the forklift before engaging the load.
2.) Using the control levers, align the forks to the correct height and angle (fig. 2).
3.) Move forward slowly, until the forks are fully engaged and the load is against the backrest (fig. 3). (If the forks are longer than the load or may engage other loads or obstacles; do not extend the forks beyond the load, raise and back the load enough to clear all obstacles, set the load down and move forward until the load is against the backrest.)
4.) Raise the forks just enough to lift the load. Tilt the mast back slightly, with the heaviest part of the load against the backrest (fig. 4). (Safely park the forklift; when securing the load to the backrest is required.) Raise or lower the forks to carrying height, side-shift the mast to center the load as needed. Check traffic; drive or back away slowly, watch your direction of travel and the stability of the load. Travel with caution at all times.

FIG. 3

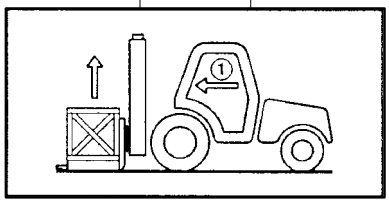
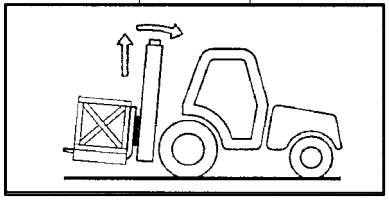


FIG. 4



LIFTING AND HANDLING LOADS *(cont.)*

Placing A Load At Ground Level

1.) Approach the area slowly, stopping the forklift to raise/lower or side-shift the load as needed. When the load is properly aligned and ready to be set down; lower the forks, tilt the mast, and prepare to back away.

2.) Before backing, insure the forks have properly disengaged the load, and that the load is stable. Check traffic and back away cautiously, assuring the forks remain clear of the load upon exit. When the forks have cleared the load; stop the forklift, raise/lower the forks and side-shift the mast to transport position.

3.) Check traffic, proceed with caution at all times.

Lifting An Elevated Load

An elevated load requires special handling, be extra cautious!

WARNING	Never lift a load from a scaffold or deposit a load on one! Never travel with an elevated load!

Before unloading a truck or trailer, make sure the wheels have been chocked to prevent movement during operations.

1.) Approach the loading area slowly with forks lowered, aligning the forklift with the load. Stop the forklift, raise the forks to the height of the load. Using the control levers, align the forks to the correct height and angle (fig. 1).

2.) Move forward slowly, making adjustments as needed, until the forks are fully engaged and the load is against the backrest. Apply the park brake and place the forward/reverse lever into neutral. Raise the forks just enough to lift the load. Tilt the mast back slightly, with the heaviest part of the load against the backrest (fig. 2).

3.) Check traffic, release the park brake, place the forklift into reverse, and cautiously back the forklift. When the forks are clear to be lowered, stop the forklift and lower the load (fig. 3). (Park the forklift if securing the load to the backrest is required.) Raise or lower the forks to transport position, side-shift the mast to center the load as needed. Check traffic; drive or back away slowly, watch your direction of travel and the stability of the load. Travel with caution at all times.

FIG. 1

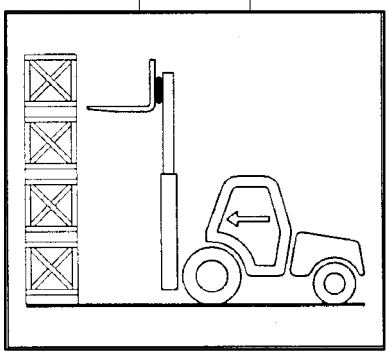


FIG. 2

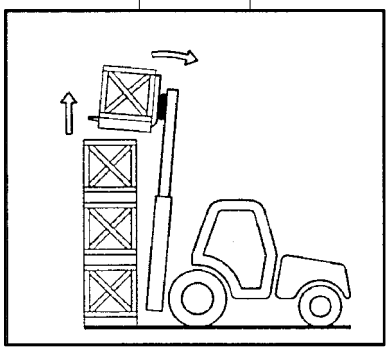
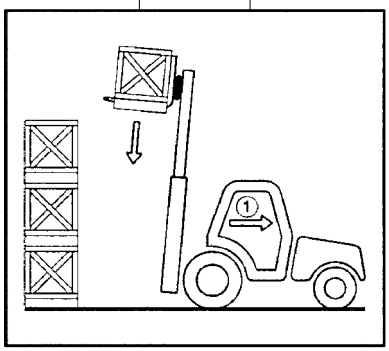


FIG. 3



LIFTING AND HANDLING LOADS (cont.)

Placing An Elevated Load

An elevated load requires special handling, be extra cautious! Before loading a truck or trailer, make sure the wheels have been chocked to prevent movement during operations.

1.) Approach the loading area slowly, aligning the forklift and the load. Stop the forklift before raising the load (fig. 1).

2.) Raise the load high enough to clear the stack. Using the control levers, align the forks to the correct angle and height for load placement (fig. 2).

3.) Move the forklift forward slowly, making adjustments as needed, until the load is properly positioned. Apply the park brake and place the forward/reverse lever into neutral. Using the control levers, lower the load into a stable position (fig. 3).

4.) Check traffic, release the park brake, place the forklift into reverse, and back the forklift slowly. Make required adjustments to the forks to properly clear the load. After clearing the load, lower the forks to transport position, side-shift the mast to center as needed. Check traffic; drive or back away slowly. Travel with caution at all times.

FIG. 1

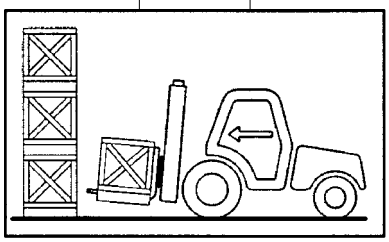


FIG. 2

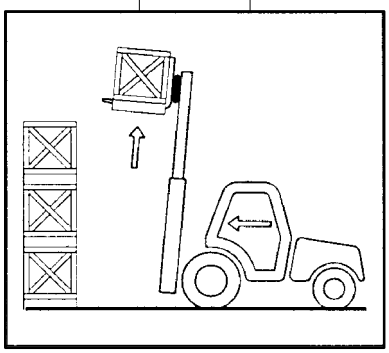
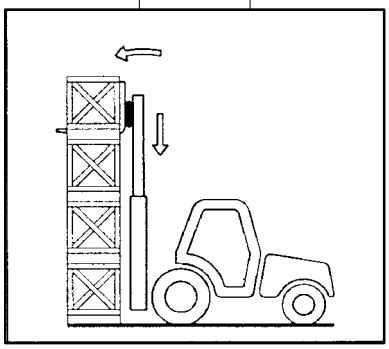


FIG. 3



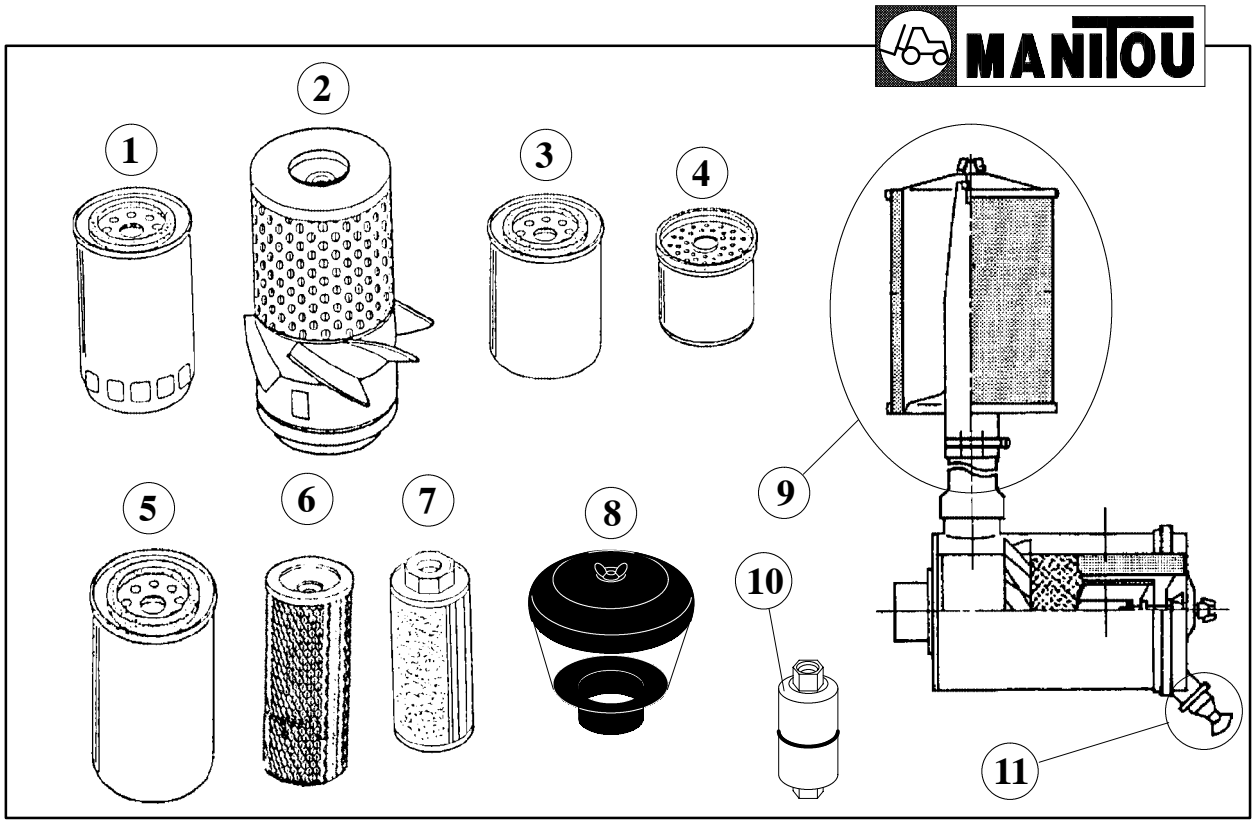
SECTION TWO

*NOTICE! STUDY THE ENTIRE MANUAL BEFORE OPERATING THE **LIFT TRUCK**!*

SERVICING THE FORKLIFT 2 - 1

NOTICE! *STUDY THE ENTIRE MANUAL BEFORE OPERATING THE* ***LIFT TRUCK****!*

FILTERS



DESCRIPTION	PART NO.	CLEAN	REPLACE	
1 – Engine oil filter (Perkins)	133755	– – – –	150 hrs.	
1 – Engine oil filter (Caterpillar)	494172	– – – –	150 hrs.	
2 – Air filter cartridge	424974	150 hrs.	450 hrs.	
3 – Transmission oil filter	561749	– – – –	450 hrs.	
4* – Fuel filter (Perkins, cartridge type)	421206	– – – –	450 hrs.	(requires glass bowl)
4* – Fuel filter (Cat., canister type)	494171	– – – –	450 hrs.	(quick–fit, no glass bowl)
5 – Hydraulic oil filter cartridge	422141	– – – –	450 hrs.	
6 – Air filter safety cartridge (Nelson)	492503	450 hrs.	900 hrs.	
7 – Hydraulic suction screen	424764	900 hrs.	if damaged	
8 – Air intake pre–cleaner	493776	150 hrs.	if damaged	
9 – Turbo pre–cleaner II (optional)	492009	150 hrs.	if damaged	
10 – Axle oil cooler filter (Poultry)	425481	900 hrs.	if damaged	
11 – Vaculator	426203	150 hrs.	if damaged	

* Contact your K–D Manitou Dealer for fuel filters not listed.

LUBRICANTS

APPLICATION	CAPACITY Qts (approx)	SHELL	MOBIL TEXACO	SPECIFICATIONS
Engine	8	Rotella 15w40	URSA Super +15w40	API CH-4
Pedal lubricant	- - - -	Rotella 15w40	URSA Super +15w40	API CH-4
Mast Chains	- - - -	Rotella 15w40	URSA Super +15w40	API CH-4
Transmission (4 speed)	9	Donax TG Dexron	Havoline Dexron III	M.2.C. 185A
Front Drive Axle	9.5*	Donax TD	Texaco TDH 1893	- - - -
Front Wheel Hub	0.7 each	Spirax DH80w90	Multi-gear EP 80w90	- - - -
Hydraulic tank	99*	Tellus T46	Rando HDZ46	ISO 46
Brake system	0.25	Donax TG Dexron	Havoline Dexron III	M.2.C. 185A
General lubricant	- - - -	Rentinax Am	Mobil Super	MIC 87 A
Cooling system	12	50% anti-freeze and water		
Fuel tank	99	(see engine manufacturer's service manual)		
Rear Axle Diff (4WD)	4.5	Spirax DH80w90	- - - -	- - - -
Rear Wheel (4WD)	0.5	Spirax DH80w90	- - - -	- - - -

* These capacities do not include fluids required to fill the auxiliary oil coolers, add approx. 4 more quarts for these systems.

SERVICE CHART *(See the following pages for Service details . . .)*

SERVICE INTERVAL	SERVICE ITEM	CHECK	CLEAN	GREASE	LUBRICATE	REPLACE	ADJUST	DRAIN
1.) Daily or every 10 hours service	- Tire/wheel & lug nut condition	X					X	
	- Engine oil level	X					X	
	- Engine coolant level	X					X	
	- Fuel level	X					X	
	- Transmission oil level	X					X	
	- Hydraulic oil level	X					X	
INITIAL 50 HOURS SERVICE	- Engine oil					X		X
	- Engine oil filter					X		
	- Fuel filter					X		
	- Hydraulic oil					X		X
	- Hydraulic oil filer					X		
2.) Every 50 hours service	- Brake fluid level	X					X	
	- Fan belt	X					X	
	- Mast chains	X					X	
	- Radiator core	X	X					
	- Fuel/water separator	X	X					
	- Fuel filter	X	X					
	- Park brake	X					X	
	- Rear wheel hub oil (4WD only)	X					X	
	- Rear axle oil level (4WD only)	X					X	
	- Rear axle oil breather (4WD only)	X	X					
	- Battery	X					X	
	- Rear drive shaft grease fittings (4WD only)		X	X				
	- Mast side shift grease fittings		X	X				
	- Mast tilt cylinder grease fittings		X	X				
	- Steer axle pivot pin grease fittings		X	X				
	- Steer cylinder grease fittings		X	X				
	- Rear wheel pivot points grease fittings		X	X				
	- Steer wheel hub grease fittings		X	X				
	- Front drive shaft grease fittings		X	X				
	- Hydraulic pump drive shaft grease fittings		X	X				

SERVICE CHART *(See the following pages for Service details . . .)*

SERVICE INTERVAL	SERVICE ITEM	CHECK	CLEAN	GREASE	LUBRICATE	REPLACE	ADJUST	DRAIN
3.) Every 150 hours service	- Engine oil					X		X
	- Engine oil filter					X		
	- Air filter cartridge	X	X					
	- Front axle oil level	X					X	
	- Front wheel hub oil level	X					X	
4.) Every 450 hours service	- Mast lift chains	X	X		X		X	
	- Air filter cartridge					X		
	- Fuel filter cartridge					X		
	- Transmission oil filter					X		
	- Hydraulic oil filter					X		
	- Fuel lift pump		X					
5.) Every 900 hours service	- Transmission oil					X		X
	- Front axle differential oil					X		X
	- Front hub reducer oil					X		X
	- Fuel tank	X	X					
	- Hydraulic oil					X		X
	- Mast and attachments	X	X	X	X		X	
	- Air filter safety cartridge					X		
	- Rear axle differential oil (4WD only)					X		X
	- Rear hub reducer oil (4WD only)					X		X
6.) Every 1800 hours service	- Radiator/cooling system	X				X		X
	- Engine valve clearance	X					X	
	- Engine fuel injectors (diesel only)	X					X	
	- Ignition system (gasoline only)	X					X	
	- Steering system hydraulics	X						
	- Water pump and thermostat	X						
	- Battery, alternator and starter	X						

SERVICING SCHEDULE

Daily or Every 10 Hours Service

General inspection

Walk around the lift truck each day before operations, inspecting for problems: structural damages, tires condition, loose mast chains, paint damage or rust, missing or damaged decals, fluid leaks, loose fittings or wires, ect.

Engine oil level

1.) Park the lift truck on level ground, stop the engine and wait a minute for the oil to settle.
2.) Check the oil using the dip stick (Figure 1, Item 1) located on the right side of the engine.
NOTE: If the engine is over-heated, allow it to cool before adding oil.
3.) Remove the oil filler cap (Figure 2, Item 1) located on the top of the engine. Add oil through the oil filler opening. 4.) Replace the cap. Check the dipstick again to verify the oil level is correct. Clean-up any spilt oil immediately. For the correct grade of oil, see LUBRICANTS.

FIG. 1

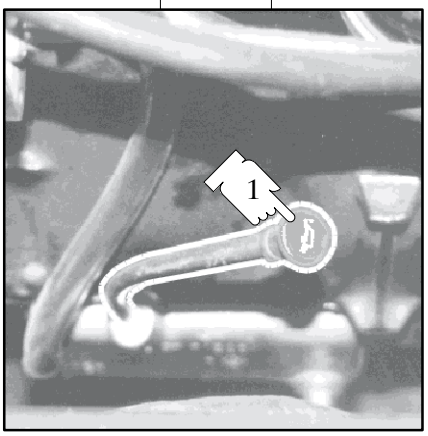
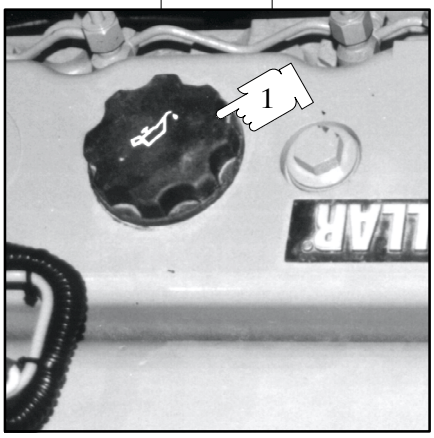


FIG. 2

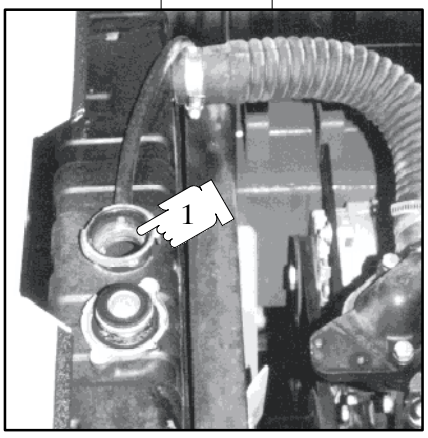


Engine coolant level

WARNING	THE ENGINE MUST BE COOL BEFORE REMOVING THE RADIATOR CAP!

1.) Park the lift truck on level ground and allow the engine to cool. If the radiator is hot to the touch, do not remove the cap!
2.) When the radiator is cool, turn the cap counter-clockwise slowly, until it reaches the safety stop. Allow any built-up pressure to escape. Press down and turn the cap to remove it (a thin film of grease on the filler neck and cap will keep corrosion down and make cap removal easier).
3.) The coolant fluid should be 1/2" below the filler port (Fig. 3, Item 1). Add a pre-mixed solution of 50% coolant and water to the system.
4.) Replace the radiator cap.

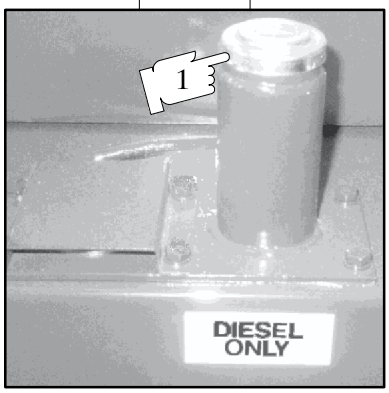
FIG. 3



SERVICING SCHEDULE *(cont.)*

Daily or Every 10 Hours Service (cont.)

FIG. 1



Fuel tank

The fuel tank is located on the left side of the lift truck. Before adding fuel to the tank, note the type of fuel required (diesel or gasoline).

If the fuel decal is missing or illegible, replace it immediately!

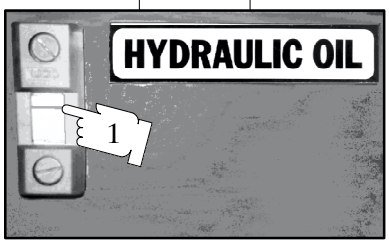
1.) Park the lift truck on level ground and stop the engine.

2.) Wipe away any dirt or debris from the cap and filler neck before opening the fuel tank.

3.) Remove the fuel cap (Figure 1, Item 1) and fill the fuel tank with clean, filtered fuel. Fill the tank at the end of each working day to avoid overnight condensation. DO NOT over-fill the tank, fill to 1" below the filler neck, allowing room for fuel expansion.

4.) Replace the fuel cap. Clean any spilt fuel immediately.

FIG. 2



Hydraulic tank

The hydraulic tank is located on the right side of the lift truck. Observe the fluid level on the sight glass (Fig. 2, Item 1).

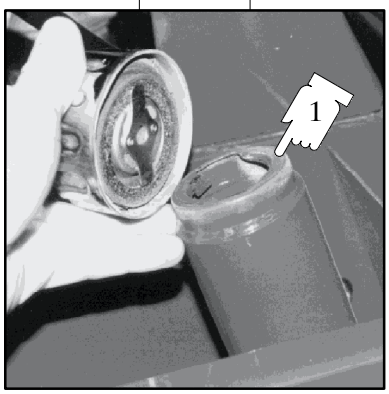
1.) Park the lift truck on level ground.

2.) Unlatch and raise the hood. Locate the hydraulic fluid filler neck on top of the hydraulic tank (Fig. 3, Item 1).

3.) Wipe away any dirt or debris from the cap and filler neck before opening the tank.

4.) Add the proper hydraulic oil (see LUBRICANTS), keeping the fluid level between the top of the sight glass and the red line (Fig. 2, Item 1). Do not overfill the tank!

FIG. 3



Transmission fluid

The transmission dipstick is located under the hood, on the left side / front of the engine compartment.

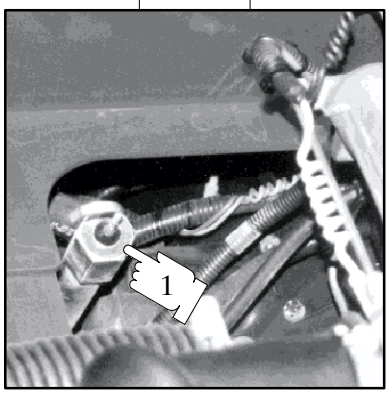
⚠ WARNING	THE EXHAUST PIPE MAY BE HOT! Wear gloves when checking the transmission oil!

1.) Park the lift truck on level ground, the engine running at idle. Place the gear shift and forward/reverse lever in neutral and apply the park brake.

2.) Check the dipstick (Fig. 4, Item 1), the fluid level must be between the notches, remove the filler tube cap to add fluid (see LUBRICANTS).

3.) Replace filler tube cap and dipstick. Clean any spilt fluid immediately.

FIG. 4



SERVICING SCHEDULE *(cont.)*

Every 50 Hours Service

Brake fluid

The brake master cylinder is located under the removable panel (Fig. 1, Item 1) on the truck's dash board.

1.) Park the lift truck on level ground, turn the engine off and apply the park brake.

2.) Push and turn the locking clips (Fig. 1, Item 2) to remove the panel.

3.) Check the brake fluid level, it is correct when filled to the "MAX" mark on the tank.

4.) If the fluid level is low, remove the cap (Fig. 2, Item 1) and add the proper fluid (see LUBRICANTS).

FIG. 1

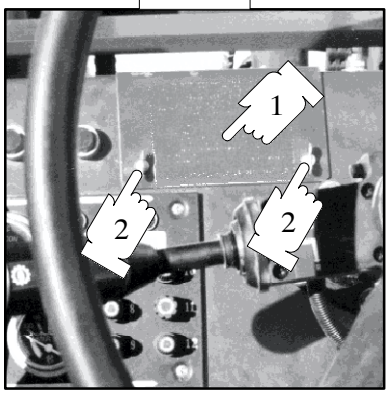
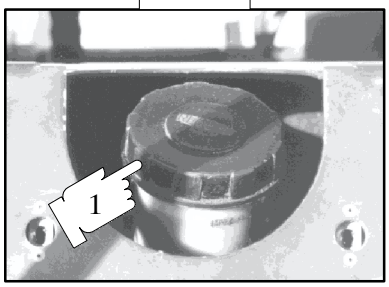


FIG. 2



Check the fan belt

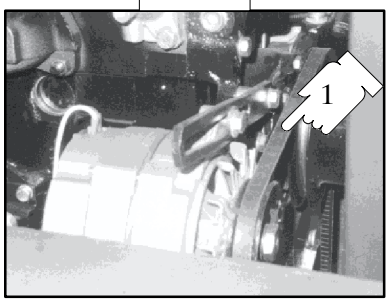
1.) Park the lift truck on level ground. Raise the engine compartment hood.

2.) Midway between the fan pulley and the alternator pulley (Fig. 3, Item 1), check the fan belt tension. The belt should have no more than 3/8" play or movement. Also check the belt for wear or other damages.

3.) To replace or adjust the belt, loosen the alternator bracket bolts and shift the alternator to the desired position.

4.) After making adjustments, re-tighten the bolts and re-check the belt tension.

FIG. 3



Check the mast lift chains

1.) Park the lift truck on level ground, with the forks lowered to the ground.

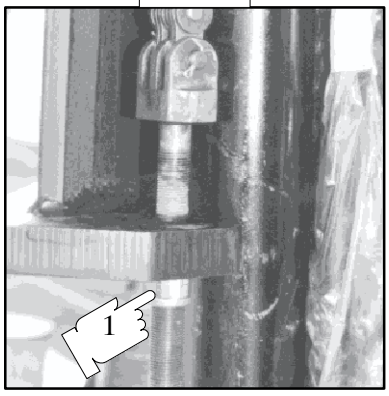
2.) Locate the two chains attached to the carriage. Push the chains back and forth, they should be under slight but equal tension.

3.) Adjust the chains by rotating the chain anchor nuts (Fig. 4, Item 1).

4.) When properly adjusted, the lower carriage rollers sit 1-3/8" to 2" below the inner rail (depending on the mast model).

5.) Check and adjust all other chains on the mast. Equal adjustment on each pair of mast chains is required for smooth mast operation.

FIG. 4



SERVICING SCHEDULE *(cont.)*

Every 50 Hours Service (cont.)

Clean the radiator core

The dirty conditions usually found at the job site can cause the radiator cooling fins to become blocked, causing the engine to run hot. To help keep the engine running cool:

1.) Park the lift truck and raise the engine compartment hood.

2.) Cover the air filter intake opening.

3.) Blow compressed air through the radiator from the fan side of the radiator (Fig. 1). In some cases, a pressure washer and detergent may be required. Be careful not to damage the radiator cooling fins!

4.) On Poultry Models; the axle oil cooler on the back of the radiator must be removed and cleaned in the same manner.

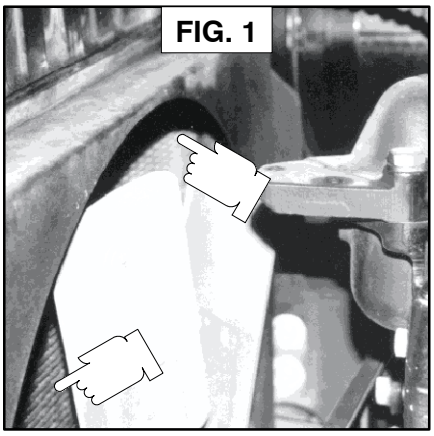


FIG. 1

Bleeding the fuel/water separator and fuel filter

The fuel/water separator and fuel filter must be purged periodically. To help reduce water (condensation) in the fuel system, keep the fuel tank filled with fuel as much as possible.

1.) Park the lift truck on level ground.

2.) Raise the engine compartment hood.

3.) Locate the water separator unit on left the side of the engine (Fig. 2, Item 1). Place a drain pan below the unit to catch the waste fuel.

4.) Loosen the bleed screw (Fig. 2, Item 2) 2 to 3 turns. Allow the diesel fuel to drain until it is free of water and debris. Re-tighten the plug as the fuel is being discharged. Follow the same instructions for purging the fuel filter (Fig. 3, located on the right side of the engine).

5.) Thoroughly clean any spills and dispose of waste properly.

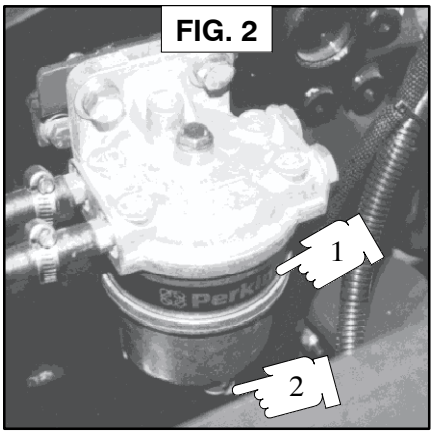


FIG. 2

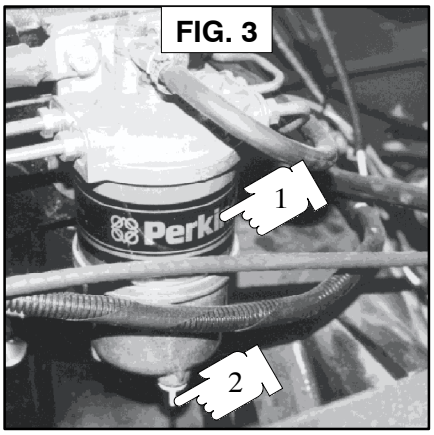


FIG. 3

Park brake adjustment

1.) Park the truck on level ground and block the wheels.

2.) Figure 4 shows the park lever in the locked position; to adjust the park brake push the lever forward (releasing the brake).

3.) Tighten the brake tension by tightening the knob on top of the lever. When properly adjusted, the park brake requires considerable force (up to 80 lbs.) to lock in place.

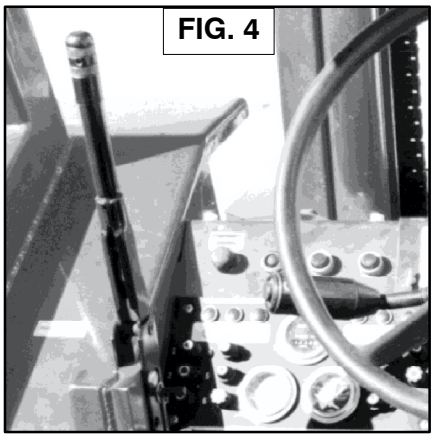
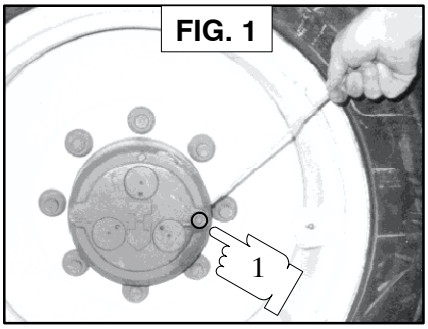


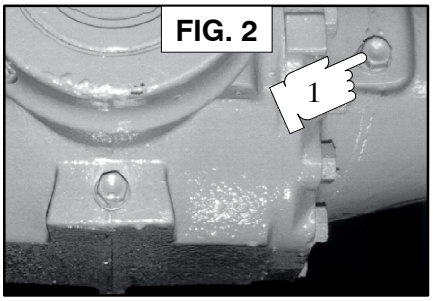
FIG. 4

SERVICING SCHEDULE *(cont.)*

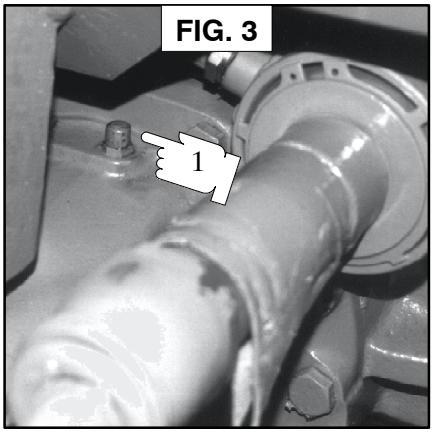
Every 50 Hours Service (cont.)



Check rear wheel hub oil level *(4WD only)*
1.) Note the position of either rear wheel hub oil filler plug (Fig. 1, Item 1). Park the lift truck on level ground, with the filler plug in the horizontal position.
2.) Remove the filler plug to check the oil level.
3.) Add oil until level with or flowing from the plug hole (see LUBRICANTS).
4.) Re-install the plug, clean any spilt oil, and repeat the operation on the opposite wheel hub.



Check rear axle oil level *(4WD only)*
1.) Park the lift truck on level ground.
2.) Locate the axle oil filler plug (Fig. 2, Item 1) on the right, rear side of the steer axle.
3.) Remove the filler plug to check the oil level.
4.) Add oil until level with or flowing from the plug hole (see LUBRICANTS).
5.) Re-install the plug and clean any spilt oil.



Check rear axle oil breather *(4WD only)*
1.) Park the lift truck on level ground.
2.) Locate the axle oil breather plug (Fig. 3, Item 1) on the right, top side of the steer axle.
3.) Check that the breather is clear of mud, grease or any other debris.
4.) When cleaning, avoid using pressure sprayers aimed directly at the breather. Water or cleansers entering the axle at the breather may contaminate the oil and damage the axle.

Check battery electrolyte level *(see also; Electrical System)*

⚠ WARNING	Battery contains sulfuric acid electrolyte! Avoid contact with skin, eyes or clothing!

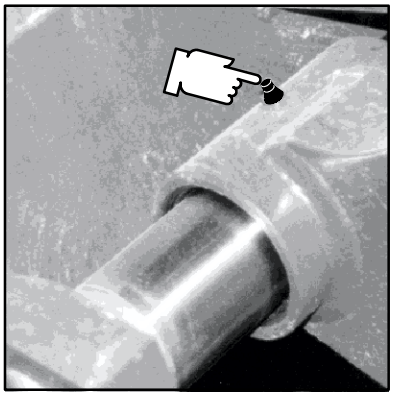
Treatment for contact of sulfuric acid electrolyte is as follows:
Skin - flush with cold water.
Eyes - flush with cold water for 15 minutes and get prompt medical attention.
Internal - drink large quantities of water or milk followed by milk of magnesia, beaten eggs or vegetable oil. Call a doctor immediately! Keep sparks, flames and cigarettes away. Do not produce sparks with cable clamps when charging the battery or starting the engine with a slave battery. Wear eye protection when working near batteries. Ventilate when charging or using in an enclosed space. Ensure vent plugs are correctly installed and tight.
1.) The battery is located in the right hand side of the engine compartment.
a) If necessary, clean the terminals and casing with a weak solution of ammonia or sodium bicarbonate (baking soda) in water. Insure the solution does not get into the battery. Always keep the battery terminals tight and free of corrosion.
b) Remove the vent plugs and check the electrolyte level, it should be 1/4" above the separator plates. If necessary, add distilled water and replace the plugs. In cold climates this operation should be carried out just before using the truck. The charging action will mix the water with the electrolyte and so prevent freezing of the battery.

SERVICING SCHEDULE *(cont.)*

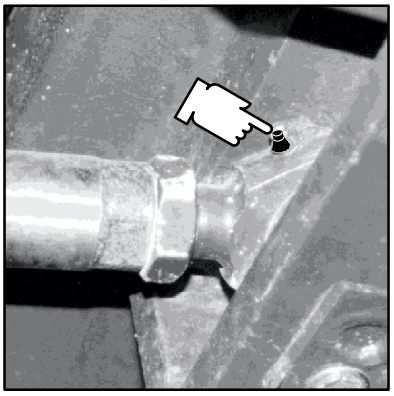
Every 50 Hours Service *(cont.)*

Lubricate the following grease fittings:

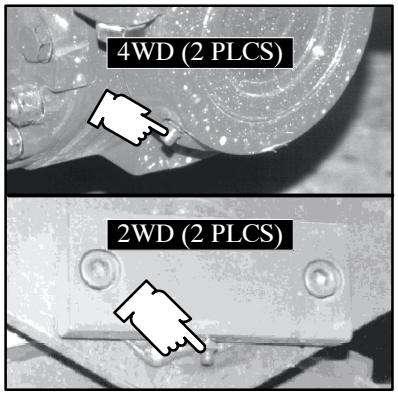
Mast side-shift bars (2 PLCS)



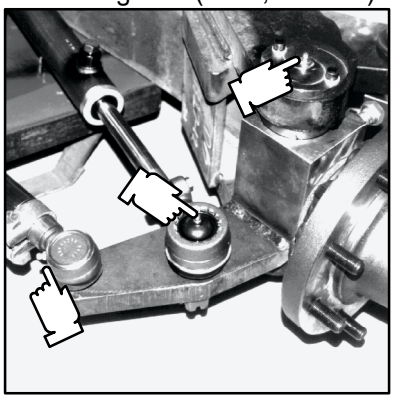
Mast tilt cylinders (2 PLCS)



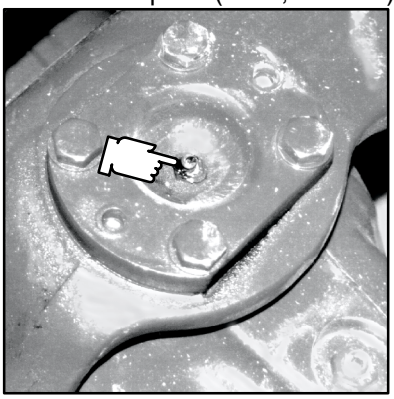
Steer axle pivot pin



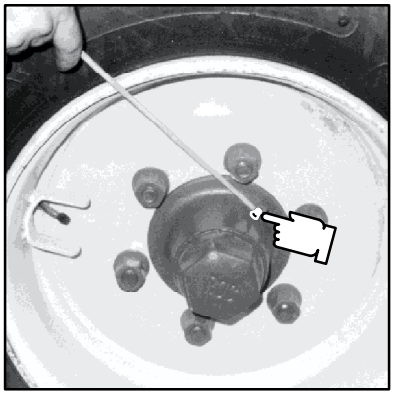
Steering axle (2WD, 2 PLCS)



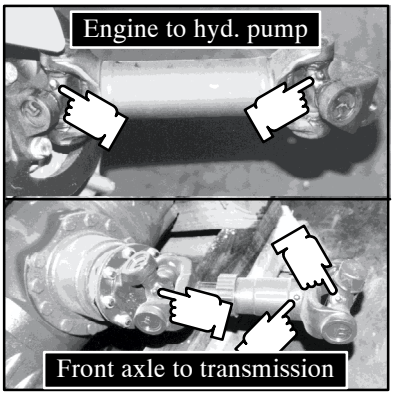
Rear wheel pivot (4WD, 4 PLCS)



Steer wheel hub (2WD, 2 PLCS)



Driveshafts
(4WD to rear wheels not shown)



SERVICING SCHEDULE *(cont.)*

Every 150 Hours Service

Replace engine oil and filter

1.) Allow the engine to run a few minutes to warm the oil.

2.) Park the lift truck on level ground.

3.) Raise the engine compartment hood and remove the oil filler cap (Fig. 2, Item 1).

4.) Place a drain pan under the engine drain plug (Fig. 1, Item 1).

⚠ WARNING	The oil filter and oil is HOT! Protect yourself from oil spills!

5.) Remove the drain plug and allow the oil to drain.

6.) Carefully remove the engine oil filter (Fig. 1, Item 2) and its seal; discard properly. Clean the oil filter housing area.

7.) Lightly lubricate the new oil filter seal. When installing the new filter (see FILTERS), hand-tighten only!

8.) Clean and re-install the oil drain plug.

9.) Add oil through the filler port (Fig. 2, Item 1), see LUBRICANTS.

Allow the oil to settle, then check the oil level dipstick (Fig. 3, Item 1).

10.) Run the engine for a few minutes, checking for oil leaks at the drain plug and oil filter. Stop the engine and allow the oil to settle.

11.) Check the oil level and adjust if necessary.

12.) Install the oil filler cap.

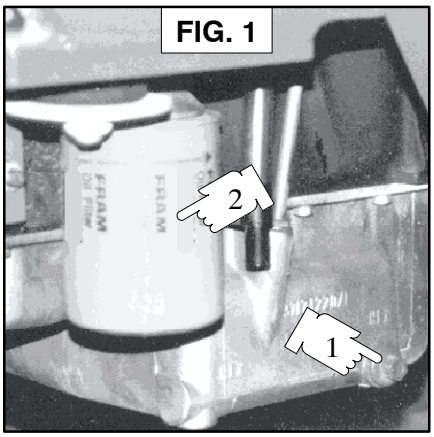


FIG. 1

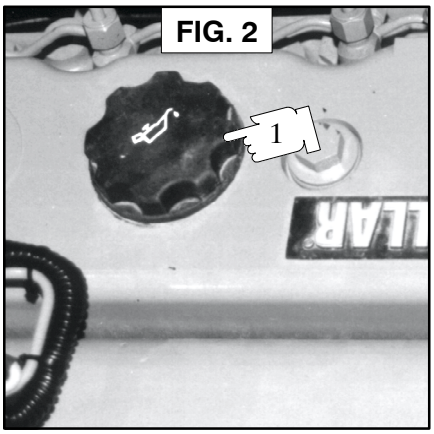


FIG. 2

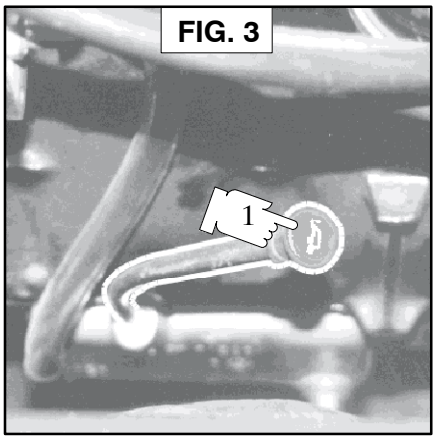


FIG. 3

SERVICING SCHEDULE *(cont.)*

Every 150 Hours Service *(cont.)*

Clean the air filter

1.) Park the lift truck on level ground and raise the hood.
2.) Locate the air filter housing on the left side of the engine compartment. Loosen the wing nut (Fig. 1, Item 1) and remove the air cleaner cover.
3.) Clean the Vaculator Cup with soap and water, replace if damaged (Fig. 1, Item 2).
4.) Remove the wing nut (Fig. 2, Item 1) and air filter element. [Nelson model air filters also contain a safety element, it must be replaced if damaged or dirty. Contact your nearest dealer.]
5.) Use a low pressure air nozzle, directed to the inside of the element, to blow dirt out. (Protect yourself and the surrounding area from dust!)
Inspect the cartridge for damages, replace if necessary.
6.) Clean the air filter housing with a clean damp cloth.
7.) Re-assemble the filter and housing.

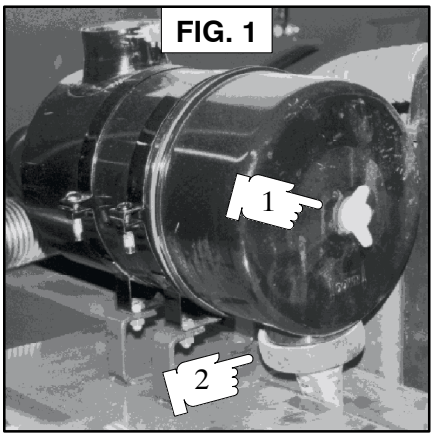


FIG. 1

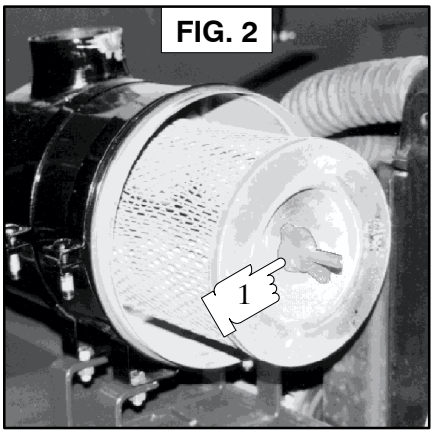


FIG. 2

Check front axle oil level

1.) Park the lift truck on level ground.
2.) Locate the oil filler plug (Fig. 3, Item 1) on the front, right side of the drive axle.
3.) Remove the filler plug; add oil until level with the filler opening (see LUBRICANTS).
4.) Clean and re-install the filler plug.

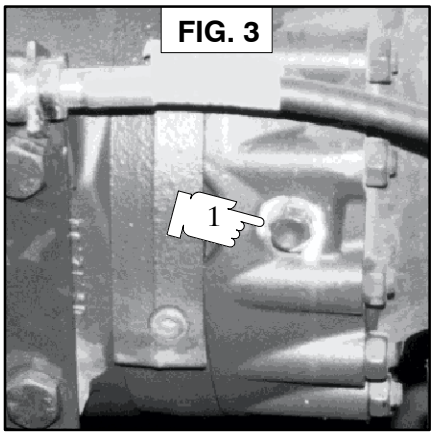


FIG. 3

Check front hub oil

1.) Note the position of either front wheel hub oil filler plug (Fig. 4, Item 1). Park the lift truck on level ground, with the filler plug in the horizontal position as shown.
2.) Remove the filler plug to check the oil level.
3.) Add oil until level with or flowing from the plug hole (see LUBRICANTS).
4.) Re-install the plug, clean any spilt oil, and repeat the operation on the opposite wheel hub.

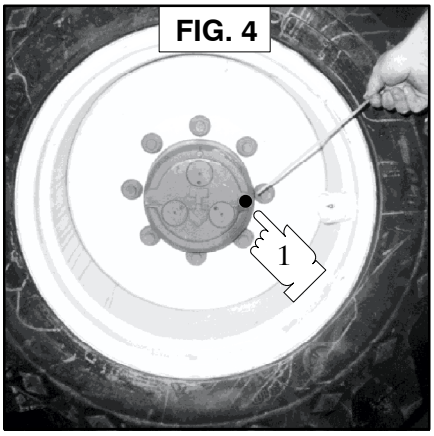
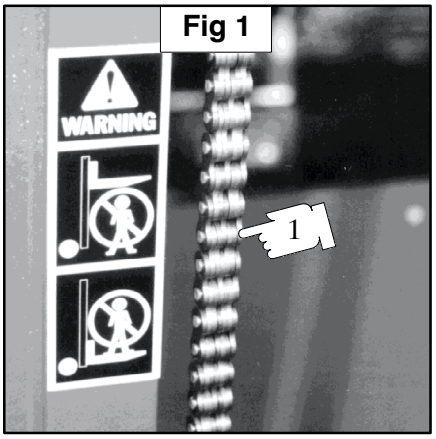


FIG. 4

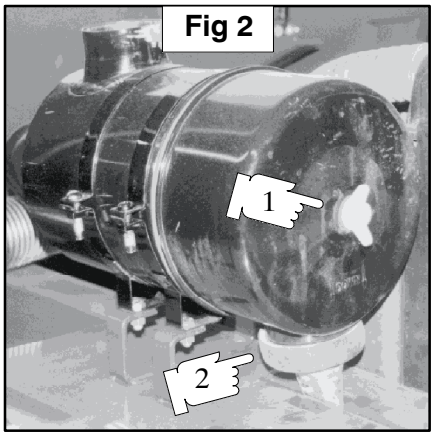
SERVICING SCHEDULE *(cont.)*

Every 450 Hours of Service



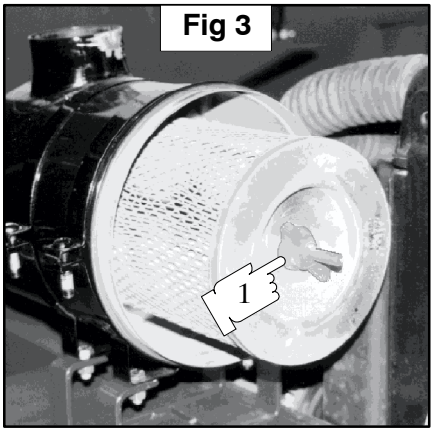
Check, clean and lubricate mast chains

1.) Park the lift truck on level ground.
2.) Place a drain pan or floor-dry under the mast, for collecting spilt degreaser.
3.) Using a stiff nylon brush and degreaser, clean all debris from each chain (Fig. 1, Item 1). (Protect yourself from the cleanser, do not smoke or work near an open flame!)
4.) Allow the degreaser to drain.
5.) Carefully inspect each chain for wear and damage.
6.) Lightly oil the chains with a brush soaked in oil (see LUBRICANTS), wipe away the excess oil.
7.) Clean excess oil and degreaser off the mast. Dispose of waste materials properly.



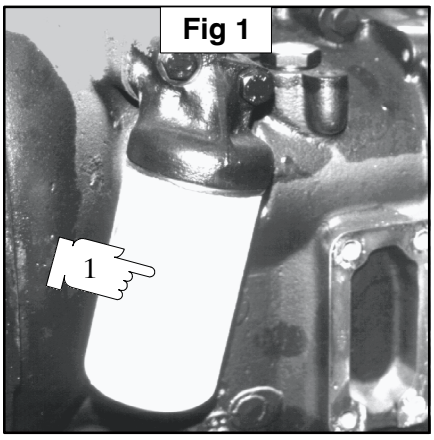
Replace the air filter element

1.) Park the lift truck on level ground and raise the hood.
2.) Locate the air filter housing on the left side of the engine compartment. Loosen the wing nut (Fig. 2, Item 1) and remove the air cleaner cover.
3.) Clean the Vaculator Cup with soap and water, replace if damaged (Fig. 2, Item 2).
4.) Remove the wing nut (Fig. 3, Item 1) and air filter element. [Nelson model air filters also contain a safety element, it must be replaced if damaged or dirty. Contact your nearest dealer.]
5.) Replace the air filter cartridge (see FILTERS).
6.) Clean the air filter housing with a clean damp cloth.
7.) Re-assemble the filter and housing.



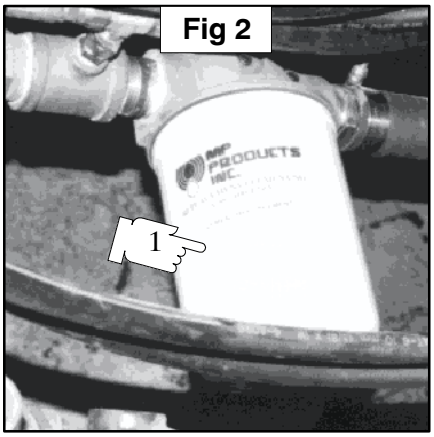
SERVICING SCHEDULE *(cont.)*

Every 450 Hours of Service (cont.)



Replace the transmission oil filter

1.) Park the lift truck on level ground.
2.) Locate the transmission oil filter (Fig. 1, Item 1) on the right side of the transmission.
3.) Clean the exterior of the filter housing to prevent debris from entering the oiling system.
4.) Use a strap wrench to loosen the filter. Install a new filter (fill the filter with oil, see LUBRICANTS and FILTERS), hand-tighten only!
5.) Thoroughly clean any spills and dispose of waste properly.
6.) After operating the truck for a few minutes, check for oil leaks.



Replace the hydraulic oil filter cartridge

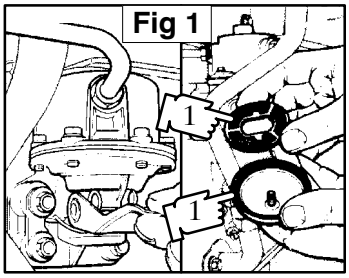
1.) Park the lift truck on level ground.
2.) Locate the hydraulic oil filter (Fig. 2, Item 1) behind the hydraulic tank.

WARNING	The hydraulic oil filter and oil may be HOT! Protect yourself from oil spills!
NOTICE	Unless a checkvalve has been installed in the hydraulic system, be prepared to capture up to 26 gallons of hydraulic fluid when the filter is removed!

3.) Clean the exterior of the filter housing to prevent debris from entering the oiling system.
4.) Use a strap wrench to remove the filter. Install a new filter (see FILTERS), hand-tighten only!
5.) Re-fill the hydraulic tank to the proper level (see LUBRICANTS).
6.) Thoroughly clean any spills and dispose of waste properly.
7.) After operating the truck for a few minutes, check for oil leaks.

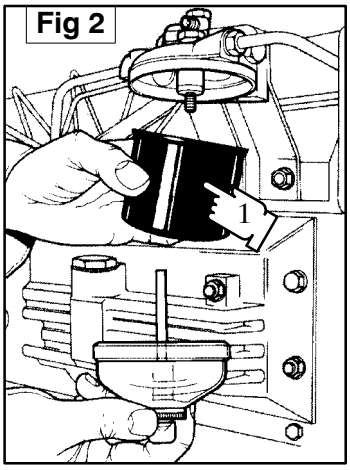
SERVICING SCHEDULE *(cont.)*

Every 450 Hours of Service (cont.)



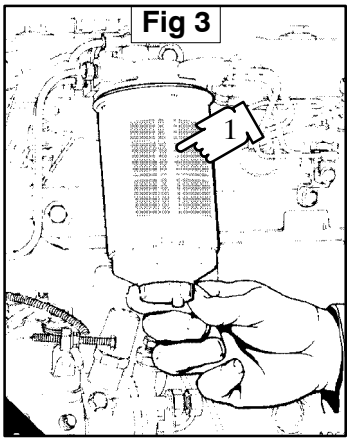
Clean the fuel lift pump

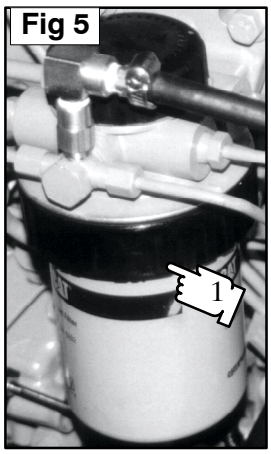
1.) Park the lift truck on level ground.
2.) Raise the engine compartment hood.
3.) Locate the fuel lift pump on left the side of the engine (Fig. 1). Place a drain pan below the unit to catch the waste fuel.
4.) Clean the exterior of the pump housing, to prevent debris from
entering the fuel system.
5.) Loosen the bolt on top of the housing, remove the cover and stainer (Fig. 1, Item 1).
6.) Carefully wash all the sediment from the lift pump unit and parts.
7.) Re-assembly the lift pump, ensure the parts are fitted together
correctly. To remove air from the system, see BLEEDING THE FUEL SYSTEM.



Replace the fuel filter cartridges

1.) Park the lift truck on level ground.
2.) Raise the engine compartment hood.
3.) Locate the fuel filter cartridge(s) on the right and left side of the engine (Fig. 2 cartridge type, Fig. 3 canister type, and Fig.4 & 5 quick-release type, see FILTERS). Place a drain pan below the unit to catch the waste fuel.
4.) Clean the exterior of the filter housing, to prevent debris from entering the fuel system.
5.) Loosen the bleed screw on the bottom of the filter to drain the fuel.
6a.) Loosen the bolt centered on the top of the cartridge type filter (Fig. 2) while holding the bottom cover. Lower the bottom cover, remove and discard the filter cartridge. Clean the inside surfaces of the filter head and cover. Install a new cartridge and re-assemble the unit, ensuring the parts are fitted together correctly.
6b.) Use a strap wrench to loosen the canister type filter (Fig. 3). Remove and replace the filter; hand-tighten only.
6c.) Rotate and remove the collar (Fig. 4 or 5). Pull the filter straight down for removal. Discard the cartridge. Align the new filter with the slots in the filter head, sliding it straight up. Re-install the collar.
7.) Thoroughly clean any spills and dispose of waste properly.
8.) Purge the air from the new fuel filter, see BLEEDING THE FUEL SYSTEM.



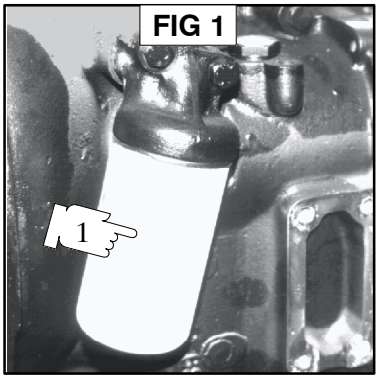


SERVICING SCHEDULE *(cont.)*

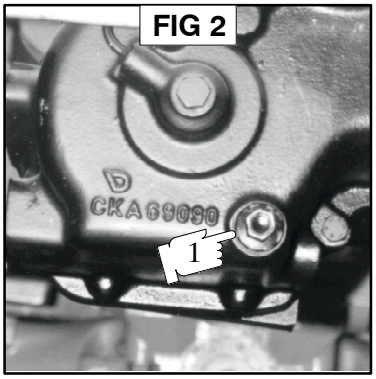
Every 900 Hours Servicing

Replace the transmission oil

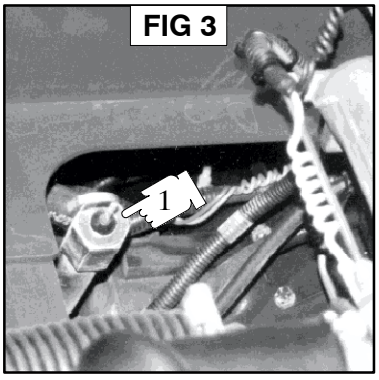
1.) Operate the lift truck for a few minutes to warm the transmission oil. Park the lift truck on level ground. Block the wheels.
2.) Locate the transmission oil filter on the right side of the transmission (Fig. 1, Item 1). Place a suitable drain pan below the transmission.
3.) Clean the exterior of the filter housing to prevent debris from entering the oiling system.
4.) Use a strap wrench to loosen the filter. Install a new filter (fill the filter with oil, see LUBRICANTS and FILTERS); hand-tighten only.
5.) Remove the transmission drain plug (Fig. 2, Item 1) on the front side of the transmission to drain the oil.
6.) Remove the transmission dipstick and filler tube cap (Fig. 3, Item 1) to help drain the oil.

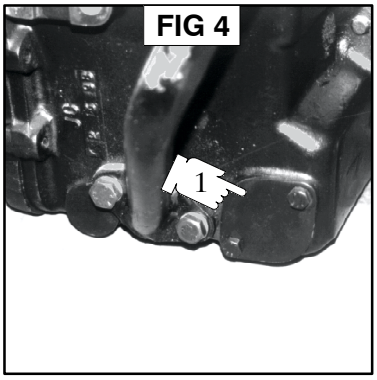


⚠ WARNING	THE EXHAUST PIPE MAY BE HOT! Wear gloves when checking the transmission oil!



7.) On the bottom, left side of the transmission, remove the filter cover (Fig. 4, Item 1) and filter. Carefully clean the filter and reinstall.
8.) Replace the oil drain plug and add oil through the filler tube, see LUBRICANTS.
9.) Replace the filler cap and dipstick. Check the oil level with the engine running at idle. Adjust the oil level as required.
10.) Thoroughly clean any spills and dispose of waste properly.
11.) After operating the truck for a few minutes, check for oil leaks.





SERVICING SCHEDULE *(cont.)*

Every 900 Hours Servicing *(cont.)*

Change the front axle differential oil
Change the rear axle differential oil *(4WD only)*
(Models without optional Drive Axle oil cooler)

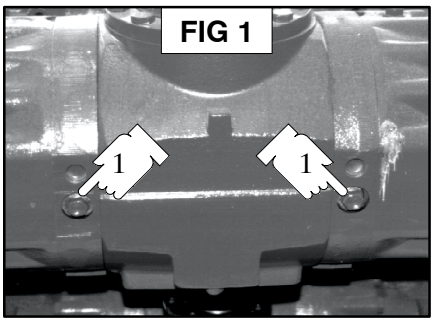


FIG 1

1.) Park the lift truck on level ground.
2.) Place a suitable drain pan below the drive axle(s).
3.) Locate and remove the drive axle oil drain plug(s) (Fig. 1, Item 1) on the bottom of the drive axle(s).
4.) Locate the oil filler plug (Fig. 2, Item 1) on the front, left side of the drive axle (backside of the rear steer axle). Clean the exterior of the filler plug to prevent debris from entering the oiling system. Remove the filler plug(s).
5.) Allow the oil to drain thoroughly.
6.) Clean and re-install the drain plug(s).
7.) Add oil until level with or flowing from the filler hole. See LUBRICANTS.
8.) Clean and re-install the filler plug(s).

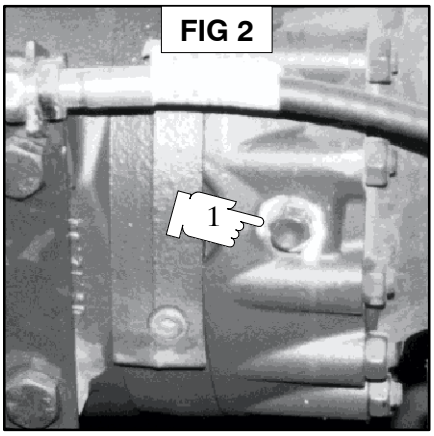


FIG 2

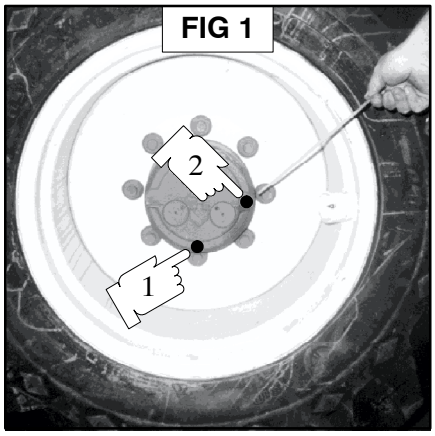
Change the front axle differential oil
(Models with optional Drive Axle oil cooler)

1.) Park the lift truck on level ground.
2.) Place a suitable drain pan below the drive axle.
3.) Locate and remove both drive axle oil drain plugs (Fig. 1, Item 1) on the bottom of the drive axle.
4.) On the front side of the drive axle, disconnect and drain the front upper oil cooler hose.
5.) On the back side of the drive axle, disconnect and drain the rear oil cooler hose. Allow the oil to drain thoroughly.
6.) Behind the drive axle, on the right side of the drive shaft, locate the drive axle oil cooler filter. Remove and clean the filter (replace if damaged or plugged), and re-install.
7.) Clean and re-install the drain plugs.
8.) Add oil until level with or flowing from the filler hole. See LUBRICANTS.
9.) Clean and re-install both cooler hoses. Run the engine for 1 - 2 minutes to fill the axle cooler with oil.
10.) Remove the front upper oil cooler hose to check the axle oil level, add oil as required.

SERVICING SCHEDULE *(cont.)*

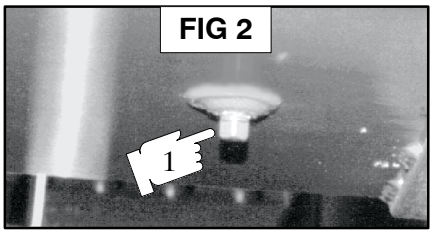
Every 900 Hours Servicing *(cont.)*

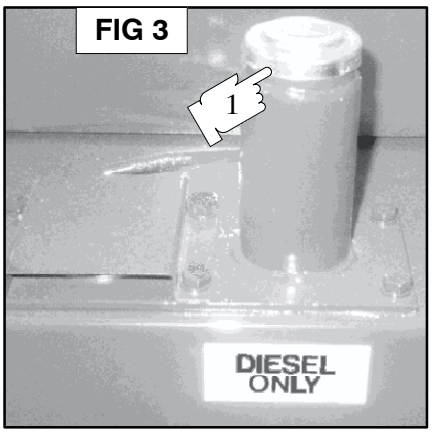
Drain and change front hub reducer oil
Drain and change rear hub reducer oil *(4WD only)*



1.) Note the position of the wheel hub oil filler plug. Park the lift truck on level ground, with the filler plug in the vertical position (Fig. 1, Item 1). Place a suitable container below the drain plug.
2.) Clean the exterior of the filler plug to prevent debris from entering the oiling system.
3.) Remove the filler plug and allow the oil to drain thoroughly.
4.) Rotate the wheel, placing the filler hole in the horizontal position (Fig. 1, Item 2).
5.) Add oil until level with or flowing from the plug hole (see LUBRICANTS).
6.) Re-install the plug, clean any spilt oil, and repeat the operation on the remaining wheel hub(s).

Cleaning the fuel tank



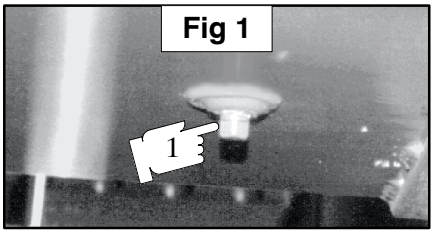


Before draining fuel from the tank, note the type of fuel required (diesel or gasoline). If the fuel decal is missing or illegible, replace it immediately!
1.) Park the lift truck on level ground and stop the engine.
2.) Place a suitable container below the drain plug (located on the bottom of the fuel tank). Clean the exterior of the drain plug to prevent debris from entering the fuel system (Fig. 2, Item 1).
3.) Remove the plug and allow the fuel to drain thoroughly.
4.) Wipe away any dirt or debris from the fuel cap and filler neck, then remove the cap (Fig.3, Item 1).
5.) Flush 2 1/2 gallons of fresh clean fuel through the tank to rinse away debris.
6.) Re-install the fuel drain plug and fill the fuel tank with clean, filtered fuel.
7.) Fill the tank at the end of each working day to avoid overnight condensation. DO NOT over-fill the tank, fill to 1" below the filler neck, allowing room for fuel expansion.
8.) Replace the fuel cap. Clean any spilt fuel immediately.

SERVICING SCHEDULE *(cont.)*

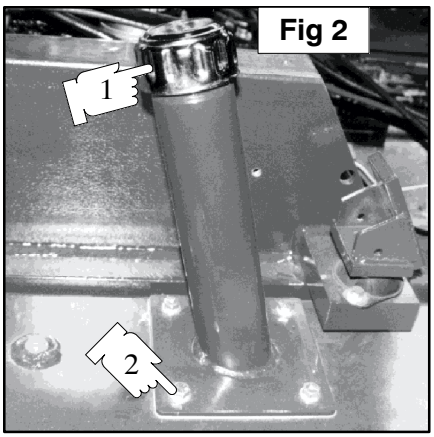
Every 900 Hours Servicing *(cont.)*

Change the hydraulic oil and filters



1.) Park the lift truck on level ground.
2.) Locate the hydraulic oil filter behind the hydraulic tank.

⚠ WARNING	The hydraulic oil filter and oil may be HOT! Protect yourself from oil spills!
NOTICE	Unless a checkvalve has been installed in the hydraulic system, be prepared to capture up to 26 gallons of hydraulic fluid when the filter is removed!



3.) Clean the exterior of the filter housing to prevent debris from entering the oiling system.
4.) Use a strap wrench to loosen the filter. Remove and replace the filter (see LUBRICANTS); hand-tighten only.
5.) Remove the hydraulic tank drain plug (Fig 1, Item 1).
6.) Remove and clean thoroughly the hydraulic filler cap (Fig 2, Item 1).
7.) Remove the filler tube bolts (Fig 2, Item 2) and filler tube.
8.) Remove, clean and re-install the filter screen from inside the hydraulic tank.
9.) Re-install the filler tube, use a new gasket if necessary.
10.) Re-install the hydraulic tank oil drain plug.
11.) Thoroughly clean any spills and dispose of waste properly.
12.) Fill the tank with oil, see LUBRICANTS.
13.) After operating the truck for a few minutes, re-check the oil level. Add oil as required and check for oil leaks.

Check/adjust the Mast's performance, lift chains, carriage, and rotator/attachments *(consult your dealer)*

Check the engine and transmission mounts *(consult your dealer)*

Check the engine's performance *(consult your dealer)*

Check the hydraulic system's performance *(consult your dealer)*

Check/change the alternator belt *(consult your dealer)*

Change the air filter safety cartridge *(consult your dealer)*

SERVICING SCHEDULE *(cont.)*

Seasonal or Every 1800 Hours Service

Check/flush radiator for corrosion *(consult your dealer)*

Change the engine/radiator cooling fluid

⚠ WARNING	THE ENGINE MUST BE COOL BEFORE REMOVING THE RADIATOR CAP!

1.) Park the lift truck on level ground, stop the engine and allow it to cool (if the radiator is hot to the touch, do not remove the cap).
2.) Turn the cap (Fig. 1, Item 1) counter-clockwise slowly, until it reaches the safety stop. Allow any built-up pressure to escape. Press down and turn the cap to remove it.
3.) Locate the radiator drain valve; on the fan side, left bottom corner of the radiator. Place suitable container below the valve.
4.) Open the valve and allow the system to drain.
5.) Remove the engine drain plugs (Figs. 3; left side of engine & Fig. 4; right side of engine), allowing the engine to drain.
6.) Re-install the engine drain plugs and close the radiator drain valve.
7.) Add only a pre-mixed solution of 50% coolant and water to the system. The coolant fluid level should be 1/2" below the filler port.
8.) Run the engine for two minutes, with the radiator cap removed, to circulated the fluid through the system. Stop the engine and add more fluid as required.
9.) Replace the radiator cap.
10.) Thoroughly clean any spills and dispose of waste fluids properly.

Check/adjust the engine valve clearance *(consult your dealer)*
Check/clean the fuel injectors
(diesel engines only, consult your dealer)
Check/clean the ignition system
(gasoline engines only, consult your dealer)
Check the steering system hydraulics *(consult your dealer)*
Check the engine's water pump and thermostat
(consult your dealer)
Check the braking system *(consult your dealer)*
Check the rear wheel ball joints *(consult your dealer)*
Check the battery, alternator, and starter *(consult your dealer)*

Fig 1

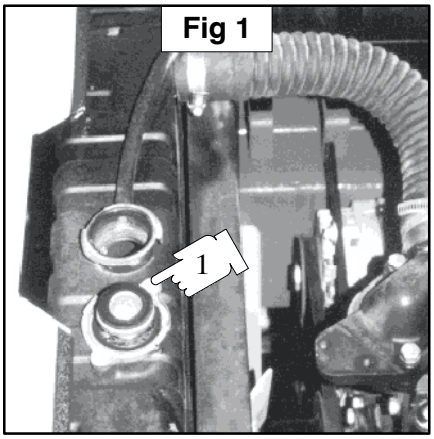


Fig 2

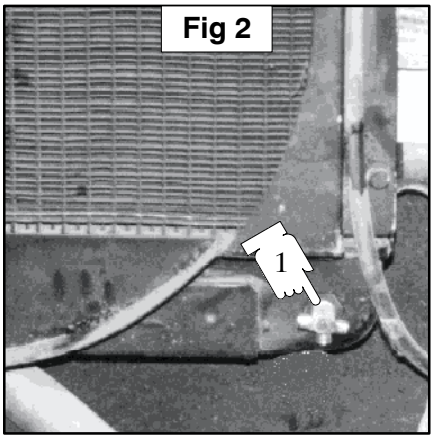


Fig 3

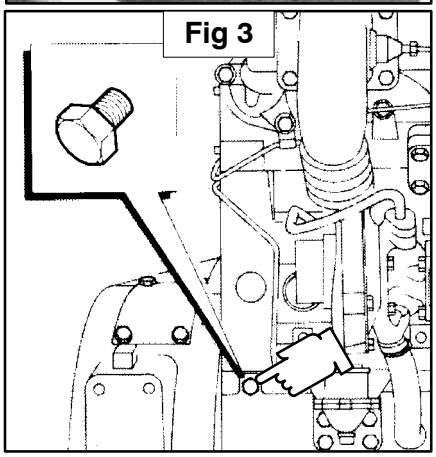
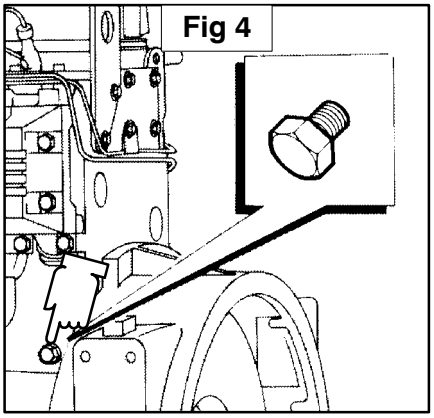


Fig 4



ELECTRICAL SYSTEM

Starter

The starter is located on the left side of the engine. No maintenance is required other than occasional cleaning, keeping the terminals properly secured and corrosion free. If the starter fails to function properly, contact your local dealer.

Alternator

The alternator is mounted on the left side of the engine. No maintenance is required other than occasional cleaning, keeping the terminals properly secured and corrosion free. If the alternator fails to function properly, contact your local dealer.

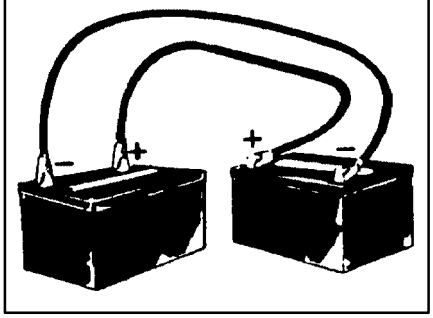
Battery

WARNING: Battery posts, terminals and related accessories contain lead and lead compounds. **Wash hands after handling.**

⚠ WARNING	ALWAYS wear eye protection when charging the battery or starting the forklift with an extra battery! Always operate the starter motor from the operator's seat!

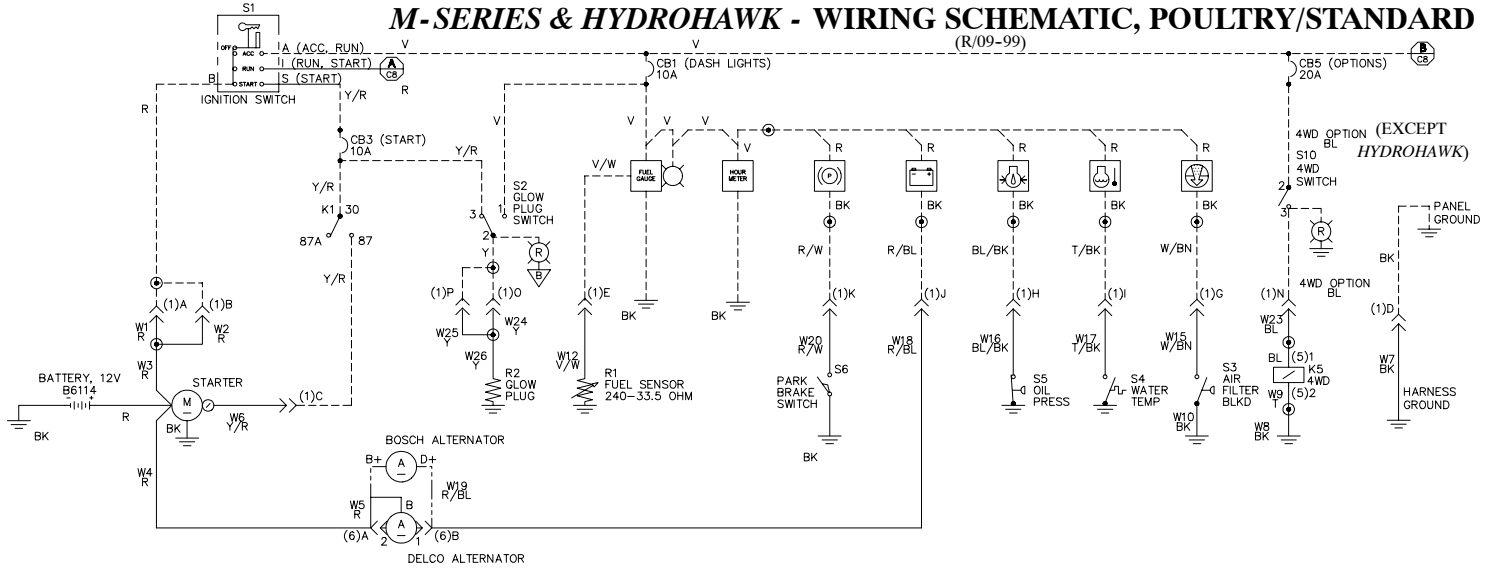
1.) NEVER remove the battery or work on the charging system while the engine is running.
2.) When installing the battery, make sure the connections are correct! The cable marked "+" or "P" must be connected to the positive (+) battery terminal. And the cable marked "–" or "N" must be connected to the negative (–) battery terminal.
3.) If an auxiliary battery must be used to assist engine starting, be sure to connect the terminals to the same polarity (Fig. 1). USE 12 VOLT BATTERY ONLY!
A) Connect the forklift battery positive (+) terminal to the auxiliary battery positive (+) terminal.
B) Connect the auxiliary battery negative (–) terminal to the forklift engine block. With the engine running at idle speed, turn on all electrical equipment (lights, etc.) then disconnect the booster cables in reverse order of the connecting procedure. This will help protect the alternator from damage due to extreme load changes.
4.) Always disconnect the battery terminals when using a battery charger.
5.) Never short circuit any of the charging components to ground (forklift chassis).
6.) Always disconnect the battery terminals when using a arc welder on the forklift.
7.) Do not attempt to start the forklift with the battery temperature below -20^0F (-29^0C). In extremely cold temperatures keep the battery in warm storage until ready for its use.

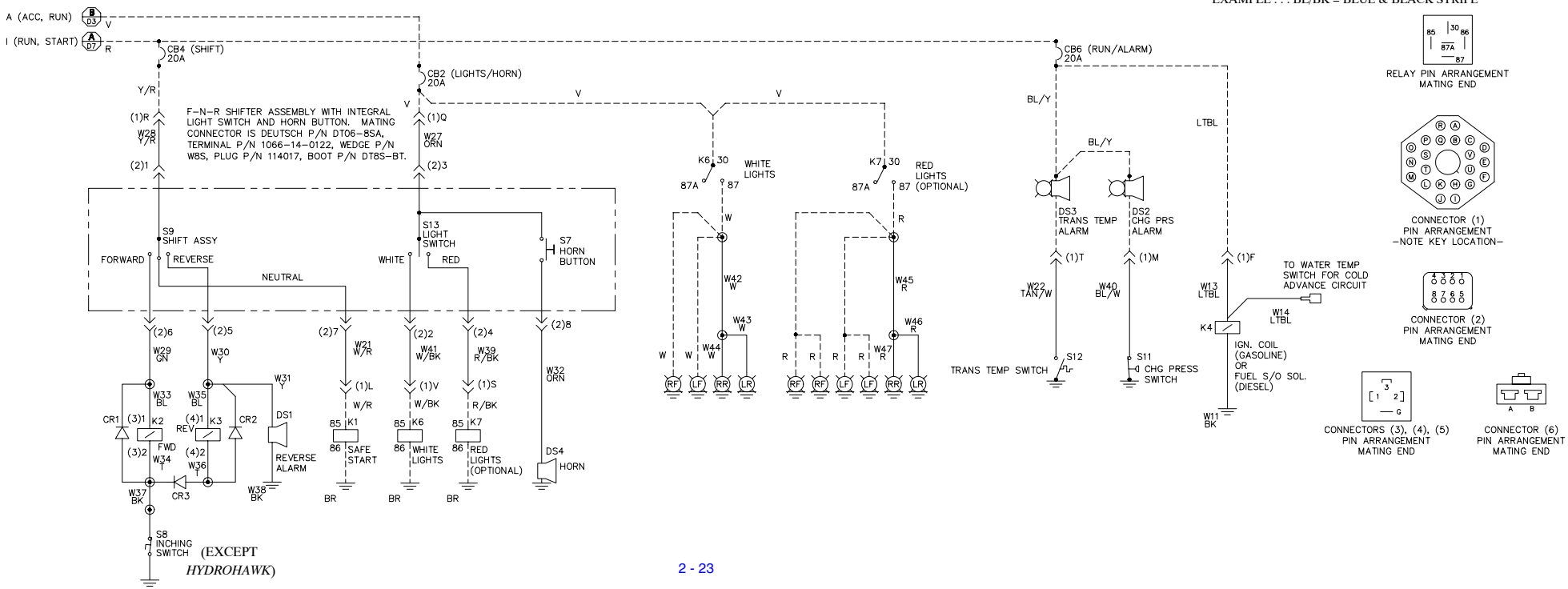
FIG 1



M-SERIES & HYDROHAWK - WIRING SCHEMATIC, POULTRY/STANDARD

(R/09-99)





NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL CIRCUITS SHOWN DE-ENERGIZED.
2. TRANMISSION MUST BE IN NEUTRAL TO START ENGINE.
3. ALL VACANT CONNECTOR POSITIONS MUST BE PLUGGED.
4. DASHED TRACES ARE PANEL WIRES, SOLID TRACES ARE HARNESS WIRES.

CONNECTOR:
(1) - 22X WEATHER PACK
(2) - 8X DEUTSCH
(3) (4) (5) - SEALED SOLENOID PLUGS
(6) - DELCO ALTERNATOR CONNECTOR

WIRE COLOR CODE:
BK = BLACK
BL = BLUE
BN = BROWN
GN = GREEN
ORG = ORANGE
R = RED
T = TAN
V = VIOLET
W = WHITE
Y = YELLOW
EXAMPLE . . . BL/BK = BLUE & BLACK STRIPE

RELAY PIN ARRANGEMENT MATING END
CONNECTOR (1) PIN ARRANGEMENT -NOTE KEY LOCATION-
CONNECTOR (2) PIN ARRANGEMENT MATING END
CONNECTORS (3), (4), (5) PIN ARRANGEMENT MATING END
CONNECTOR (6) PIN ARRANGEMENT MATING END

BLEEDING THE FUEL SYSTEM

If air enters the fuel system, it must be eliminated before the engine can be started. Air can enter the system if:

a) The fuel tank is drained during normal operation.

b) The low-pressure fuel pipes are disconnected.

c) A part of the low-pressure fuel system leaks during engine operation.

In order to eliminate air from the fuel system, proceed as follows:

1.) On the right side of the engine; loosen the vent plug on the top of the fuel filter (Fig 1, Item 1).

2.) Operate the priming lever on the fuel lift pump (Fig 2, Item 1) until fuel, free from air, comes from the filter vent point. Tighten the vent plug. (If the drive cam of the fuel lift pump is at the point of maximum cam lift, it will not be possible to operate the priming lever. In this situation, the crankshaft must be turned one revolution.)

3.) Turn the key switch to the "ON" position.

4.) Loosen the vent screw in the lock screw of the hydraulic head (Fig 3, Item 1) and the vent screw on the governor cover of the fuel injection pump (Fig 3, Item 2).

5.) Operate the priming lever of the fuel lift pump until fuel, free from air, comes from the vent screws. Tighten the vent screws.

6.) Loosen the union nut (Fig 4, Item 1) at the fuelled starting aid and operate the lift pump until fuel, free from air, comes from the connection. Tighten the union nut at the starting aid.

7.) Loosen the union nuts of the high-pressure pipes (Fig 5, Item 1) at two of the atomizers. Operate the starter motor until fuel, free from air, comes from the pipe connections. Tighten the high-pressure pipe connections.

8.) The engine is now ready to start. If the engine functions correctly for a short time and then stops or runs roughly, check for air in the fuel system. If there is air in the fuel system, there is probably a leak in the low pressure system.

Fig 1

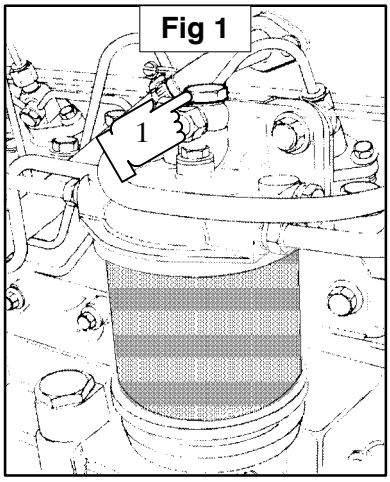


Fig 2

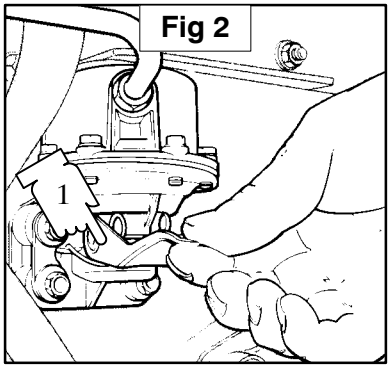


Fig 3

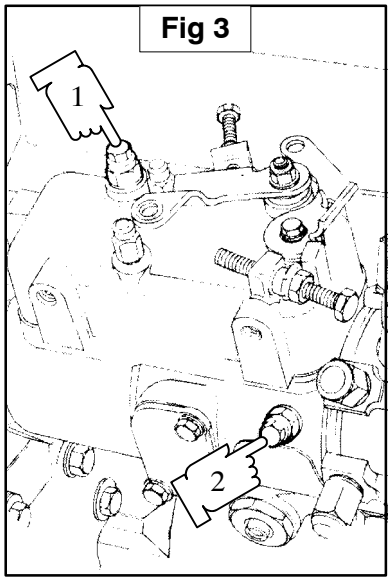


Fig 5

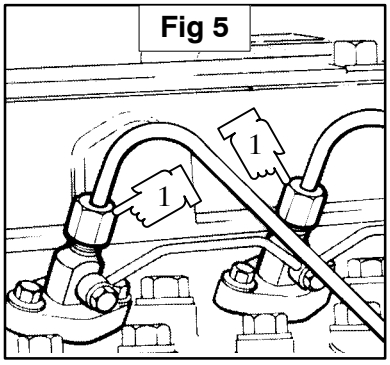
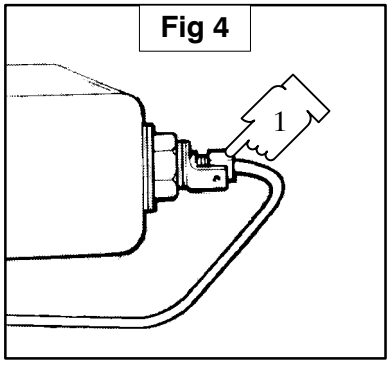


Fig 4



TRUCK INSPECTION CHECK LIST: ***DATE:***

(photocopy this page to use for your records)

( ) 1. Tire condition and correct pressure _____
( ) 2. Radiator coolant level & antifreeze protection _____
( ) 3. Fan belt tightness and condition _____
( ) 4. Battery cleanliness, vented & electrolyte level _____
( ) 5. Engine oil level _____
( ) 6. Transmission oil level _____
( ) 7. Hydraulic system oil level _____
( ) 8. Axle and reducer oil level _____
( ) 9. Starter safety switch operation _____
( ) 10. All wheel lug nuts _____
( ) 11. Park brake adjustment _____
( ) 12. Steer wheel toe-in _____
( ) 13. Fuel level _____
( ) 14. Master cylinder oil level _____
( ) 15. Steer cylinder lock nut & rod eye _____
( ) 16. Tilt & side shift cyl. lock nuts _____
( ) 17. Tilt cylinder pins & snap rings _____
( ) 18. Overhead guard _____
( ) 19. Mast mount bars _____
( ) 20. Mast chain lub., connection & tension _____
( ) 21. All decals and warnings _____
( ) 22. Lights and instruments _____
( ) 23. Fluid and oil leaks _____
( ) 24. Engine max. throttle adj _____
( ) 25. Injector / pump adj _____
( ) 26. Neutral start switch _____
( ) 27. Correct Hyd. control opr _____
    a. Tilt Cyl. operation _____
    b. Side Shift operation _____
    c. Lift Cyl. operation _____
( ) 28. Steering control response _____
( ) 29. Relief pressure setting _____
( ) 30. Diff. lock engagement _____

SECTION THREE

*NOTICE! STUDY THE ENTIRE MANUAL BEFORE OPERATING THE **LIFT TRUCK**!*

SPECIFICATIONS 3 - 1

DESCRIPTION

The ***'M' Series*** Rough Terrain Forklifts are specially designed for use on unimproved natural terrain as well as the disturbed terrain of construction sites where the smaller industrial lift trucks cannot operate. In this role, the lift truck is of maximum benefit to construction engineers, builders, farmers, etc., for transporting materials and equipment over uneven ground with a minimum of labor and expense.

The lift truck has been built around well proven industrial components with specific modifications which enable it to withstand demanding work. The powertrain unit is supported within a strong steel channel chassis designed to absorb the stresses of the mast, counterweights and steering axle. The ***'M' Series'*** powertrain utilizes the Perkins or Caterpillar Engine, the Turner Converter Transmission, a Hurth Drive Axle, and a Hurth Steering Axle (4 wheel drive only) or Manitou Steering Axle (2 wheel drive only).

The mast rails are manufactured to K-D Manitou, Inc. specifications and roll one within the other. The roller mounted fork carriage is lifted by a chain system powered by single acting hydraulic cylinders.

A power steering system is utilized, consisting of an engine powered hydraulic pump, a power steering valve mounted to the steering wheel and hydraulic cylinder(s) for steering the rear axle.

All hydraulic circuits are continually filtered and cooled during operation. Optional oil coolers are also available for some models (contact your dealer for options).

The standard *'M' Series* transmission is a 4 speed forward/reverse unit with automatic clutch (torque convertor). Disengage the transmission and change gears by depressing the dump valve foot pedal.

The lift truck is designed with a complete electrical system: alternator with built-in voltage regulator, starter, and flood lights, etc.. Red Warning Lights are provided on the dash, above the instrument panel; one for indicating oil over-heat on the front drive axle (Poultry Models), one for indicating low oil pressure in the transmission, and another for indicating oil over-heat in the transmission. These lights alert the driver to inspect the cooling systems immediately, before serious mechanical damage occurs. Additional electrical equipment is also available: heater, fan, windshield wiper(s), rotating lights, etc..

IDENTIFICATION NAME PLATES

TECHNICAL DATA

All technical data provided in this manual is subject to production changes, release of new models, and improved product designs. If a question arises regarding your lift truck, please consult your dealer or K–D Manitou for the latest available information.

NOTE: The terms ”left”, ”right”, ”front”, and ”rear” refer to the location of forklift components in relation to the operator seated normally, facing forward in the operator’s seat. When ordering service parts or requesting technical information, be prepared to quote the applicable Model/Serial Numbers:

FORKLIFT MANUFACTURER’S ID PLATE (FIG. A)

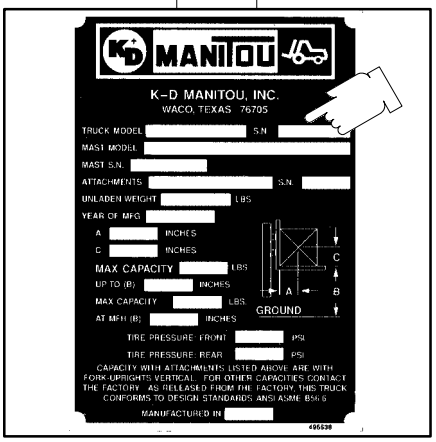
(Right side of Operator’s Seat)

Truck Model Number:_____
Truck Serial Number:_____

Mast Model Number:_____
Mast Serial Number:_____

Attachment Model Number:_____
Attachment Serial Number:_____

A

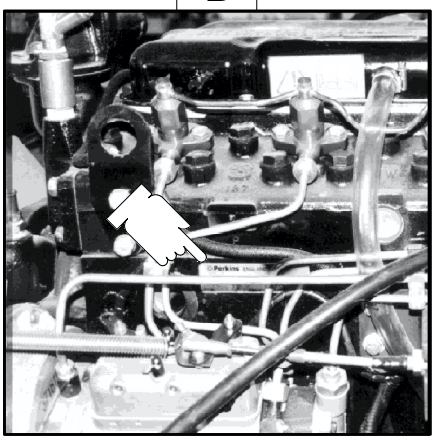


ENGINE MANUFACTURER’S ID PLATE (FIG. B)

(Right side of engine)

Engine Model Name & fuel type:_____
Engine Serial Number:_____

B



*NOTICE! STUDY THE ENTIRE MANUAL BEFORE OPERATING THE **LIFT TRUCK**!*

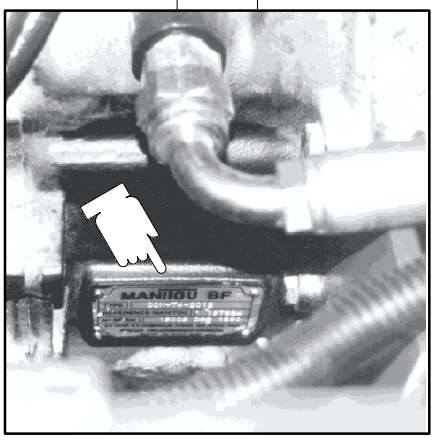
IDENTIFICATION NAME PLATES *(cont.)*

TRANSMISSION MANUFACTURER'S ID PLATE (FIG. C)

(Left side of transmission)

Turner Transmission Serial Number:_____

C

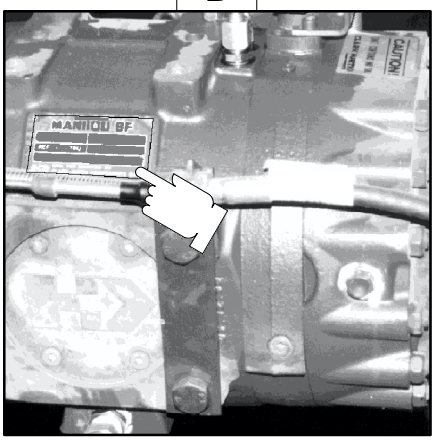


FRONT DRIVE AXLE MANUFACTURER'S ID PLATE (FIG. D)

(Front/top side of axle)

Front Axle (Hurth) Serial Number:_____

D



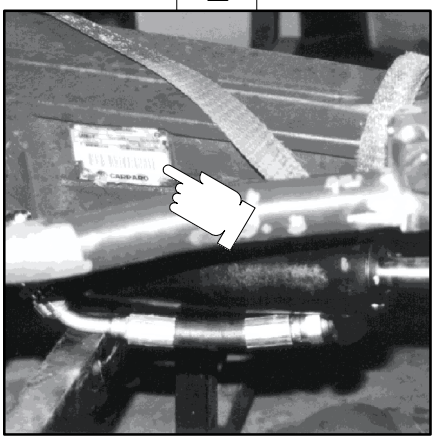
REAR DRIVE AXLE MANUFACTURER'S ID PLATE (FIG. E)

(Left side/front of axle)

Rear Axle (Hurth) Serial Number (4WD only):

_____

E



SPECIFICATIONS

Electrical Circuit

Ground	Negative
Battery	12 V - 105 Ah
Alternator	12 V - 65 Amp
Voltage Regulator	Built-in the alternator
Starter	12 V

Diesel engines

Model	Perkins 1004.4	Caterpillar 3054B
Number of cylinders	4	4
Number of cycles	4	4
Injection system	Direct	Direct
Firing Order	1-3-4-2	1-3-4-2
Valve Clearance		
- Intake	.008in.	.008in.
- Exhaust	.018in.	.018in.
Cylinder Displacement	243.8 CI (4.2L)	243.8 CI (4.2L)
Bore	3.94 in.	3.94 in.
Stroke	5.00 in.	5.00 in.
Compression	16.5:1	16.5:1
Rated Speed	2300 rpm	2300 rpm
Idle Speed	775 rpm	775 rpm
Maximum speed with no load	2475 rpm	2475 rpm
Power	89 bhp	89 bhp
Maximum torque 1250 r.p.m.	217 ft/lb	217 ft/lb

Cooling circuit

Type	Water cooled
Fan	
- No. of blades	6 or 10
- Diameter	18 in. (457 mm)
Thermostat starts to open	180 F
Fully Opened	203 F

SPECIFICATIONS *(cont.)*

Transmission	Turner Powertrain (with torque converter)
Gearbox:	
- No. of Forward Gears	4
- No. of Reverse Gears	4
Four Wheel Drive (4wd) Engagement	electric toggle switch, (activate with engine running)
Front Axle	Hurth
Wheel reducer	Epicycloid
Locking differential	Foot operated (mechanical)
Rear Axle	
2WD	Factory manufactured, solid steel beam construction
4WD	Hurth
Brakes	
Type:	
- Service Brake	Oil cooled, multi-disc
	Foot pedal hydraulic brake applied on the front wheels
- Parking Brake	Hand lever applied to the front wheels

Models	***Tires***	***Size***	***Pressure***
All (except -PXL)	(Front)	16.9-24 R4 10 Ply	32psi
	(Rear)	12-16.5 10 Ply	75psi
M2 30 CP/-P/-PL	(Front)	17.5L-R24 R4 10 Ply	52psi
	(Rear)	12-16.5 10 Ply	75psi
M2 30 CP/-P/-PL	(Front)	17.5-25 10 Ply	50psi
	(Rear)	12-16.5 10 Ply	75psi
M2 30 CP-PXL	(Front)	15-19.5 8 Ply	60psi
	(Rear)	12-16.5 10 Ply	75psi

Wheel Lug Nut Torque

Drive Wheel	325 to 346 ft/lb.
Steer Wheel (2-Wheel Drive)	231 to 253 ft/lb.
Steer Wheel (4-Wheel Drive)	304 to 336 ft/lb.

SPECIFICATIONS *(cont.)*

Hydraulic Circuit

Main Circuit	
- Type of Pump	Gear type
- Flow Rate (@ 2750 rpm)	25.5 gpm

Hydraulic Pressure Settings:

Mast model:	pressure:	capacity:
3500/3600	1850 psi	8000 lb/10000 lb
4000	1950 psi	8000 lb
4500	1900 psi	6000 lb
4700	1500, 1800 & 2100 psi	4, 5 & 6000 lb
4800	2100 psi	3600 lb
5300	1500 psi	4000 lb
7600	2000 psi	8000 lb

Power Steering Circuit	Hydrostatic
M2 30 CP-P, M4 30 CP-P & M2 30 CP-PXL	Load Sensing
- Flow Rate (@ 2200 rpm)	7 gpm
- Relief Valve Setting	1700 psi
Main Control Valve	Sectional type (3 spool std)
- First Spool	3 way spring centered for mast lift
- Second Spool	4 way spring centered w/anticavitation valves on both ports for mast tilt
- Third Spool	4 way spring centered for side mast shift
Maximum Valve Capacity	3000 psi

Maximum Travel Speed

Unloaded	15 mph
Loaded	6 mph

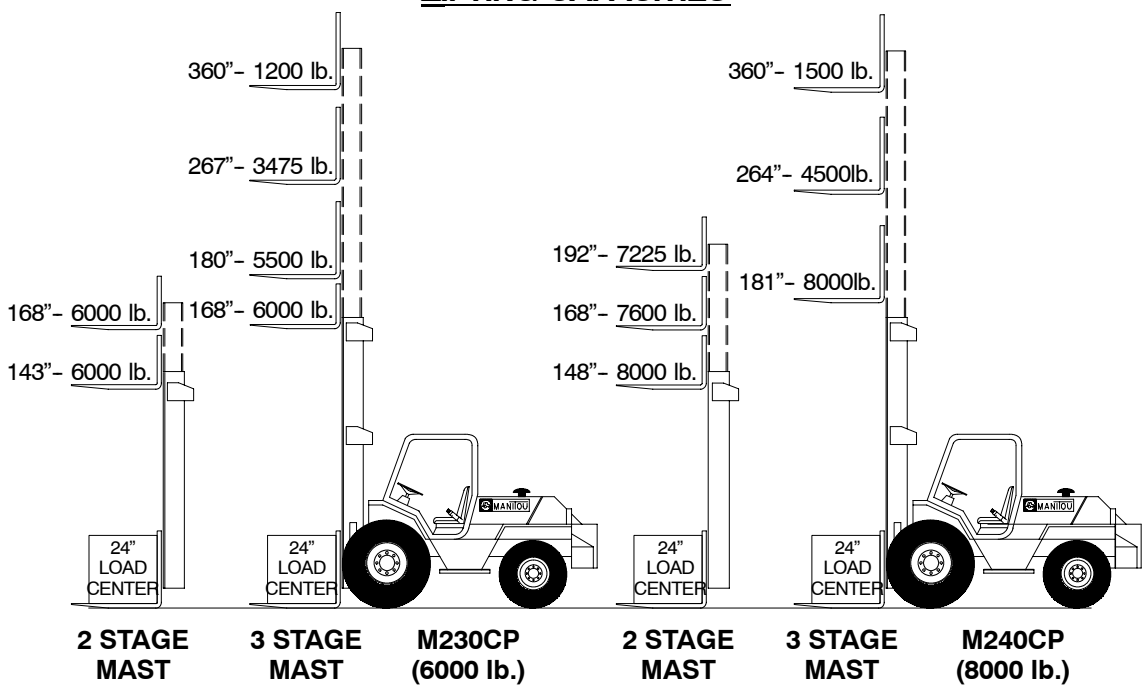
Forks

Standard	Pallet Type 48” length
Optional	Pallet Type 60”, 72”, 84” and 96” lengths
- Type Options	Shaft or ITA Hook
Concrete Block Forks	Optional
- Sizes	42” or 48” lengths
- Type Options	Shaft or ITA Hook

Note: Block forks have a maximum capacity per fork of 1,000 lbs. @ 24” load-center.

SPECIFICATIONS *(cont.)*

LIFTING CAPACITIES



Lift Truck Weights *(approx.)*

M2 30 CP . . . . . 14,520 lbs. w/5307 Model Mast, Standard Carriage & 48" Forks
M2 30 CP-P . . . . . 13,800 lbs. w/4804 Model Mast, 4882 Model Rotator Carriage & 84" Forks
M2 30 CP-PXL . . . . . 13,700 lbs. w/4804 Model Mast, 4882 Model Rotator Carriage & 84" Forks
M2 40 CP . . . . . 14,700 lbs. w/3503 Model Mast, Standard Carriage & 48" Forks
M4 30 CP-P . . . . . 14,000 lbs. w/4804 Model Mast, 4882 Model Rotator Carriage & 84" Forks

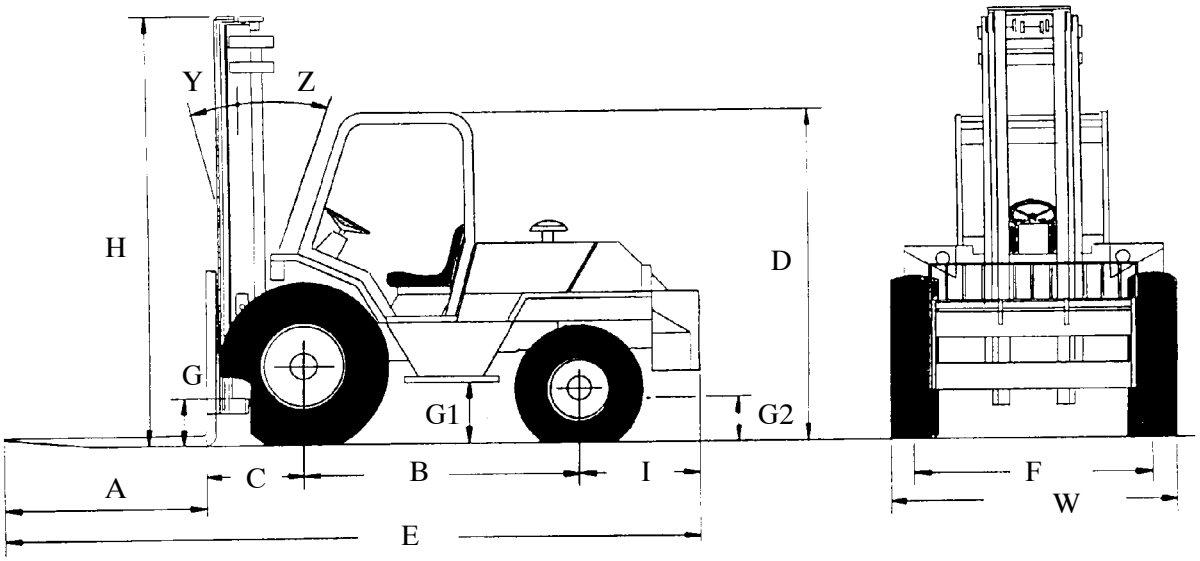
Lighting

Standard Models:	Forward: 2 white sealed beams
	Rearward: 2 white sealed beams
Poultry Models:	Forward: 4 white, 2 red sealed beams
	Rearward: 2 white, 2 red sealed beams

(Optional rotating beacons available)

SPECIFICATIONS *(cont.)*

DIMENSIONS *(Standard Cab)*

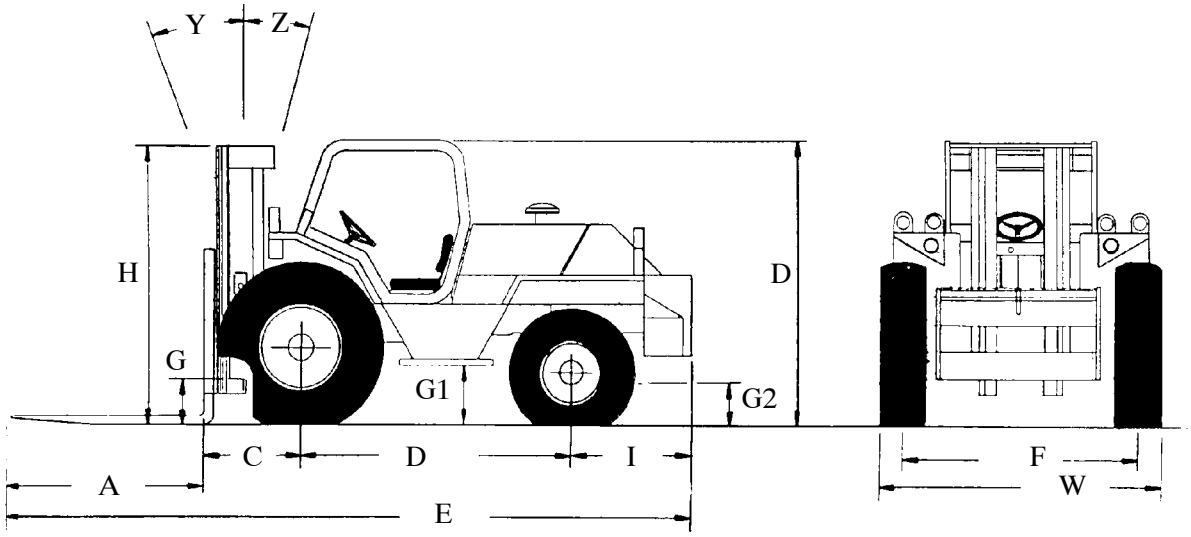


DIM.	***M230CP***	***M240CP***	***M250CP***	***M430CP***	***M440CP***
A	48	48	48	48	48
B	81.5	81.5	81.5	81.5	81.5
C	34.25				
D	95	95	95	95	95
E	194.25				
F	70.5	70.5	72.5	70.5	70.5
G	12.0	12.0	12.0	12.0	12.0
G1	17.0	17.0	17.0	17.0	17.0
G2	12.5	12.5	12.5	14.4	14.4
H	varies	varies	varies	varies	varies
I	30.50	34.75	38.50	30.5	34.75
W	87.5	87.5	89.5	87.5	87.5
Y*	20^0	20^0	20^0	20^0	20^0
Z	15^0	15^0	15^0	15^0	15^0

* 45^0 forward tilt option available.

SPECIFICATIONS *(cont.)*

DIMENSIONS *(Poultry Cab)*



DIM.	***M2 30 CP P***	***M2 30 CP PL***	***M2 30 CP PXL***	***M4 30 CP P*** ***M4 30 CP D***
A	72	72	72	72
B	81.5	81.5	81.5	81.5
C	38.25	38.25	38.25	38.25
D	84	80	77	84
E	222.25	222.25	222.25	222.25
F	70.5	70.5	64.5	70.5
G	12.0	12.0	12.0	12.0
G1	17.0	17.0	13.5	17.0
G2	12.5	12.5	11.75	14.4
H	varies	varies	varies	varies
I	30.5	30.5	30.5	30.5
W	87.5	86.5	80.5	87.5
Y*	20^0	20^0	20^0	20^0
Z	15^0	15^0	15^0	15^0

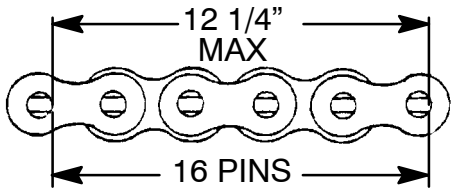
* 45^0 forward tilt option available.

SPECIFICATIONS *(cont.)*

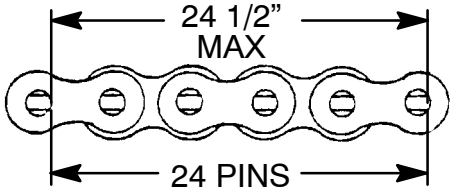
Mast chain wear specifications

Replace chain when stretch exceeds dimensions shown below:

BL 634
(3/4” PITCH)
#60



BL 844
BL 834
(1” PITCH)
#80



RC 85
(1” PITCH)
#80